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Sowing the Seed

Shakespeare once asked "What's in a name?" By reference to a rose he minimised its significance. Yet one could hardly blame a person bearing the patronymic of Pig, or Muggins, for taking steps to change it! Still, to achieve this end it is not always necessary to alter a name, because by using what has become to be known as a "build-up," it can be rendered respectable or even glamorised. Thus it is with the foundry industry, and here we may interpolate that before we assumed responsibility for the conduct of this JOURNAL, the word normally accorded to foundry activities was "trade." We believe that that small change did much to enhance its position *vis-à-vis* with other manufacturing activities. In engineering circles, the basic position of the foundry industry is well known and appreciated, but how does it stand for the rest of the community? Conversations with some of London's professional and business men after the last Trade Union Congress taught us that there existed a wide belief that the Amalgamated Union of Foundry Workers was the employees' organisation for the iron and steel industry! Moreover, this notion persisted despite Mr. Lincoln Evans' emphasis on the fact that his union—the British Iron, Steel and Kindred Trades Association—was the one really involved. Here then is an outstanding case of the need for "corrective" propaganda.

It is clear, therefore, if there be a desire to place the foundry industry in a correct perspective to the man in the street, there must be a continuous "build-up" of the word "foundry" and its derivatives. Fortunately, there exists an organisation—the Foundry Information Committee—operating from another section of this office and directed by Mr. Gordon West, which for the last six months has been doing a remarkably good job of work. For success, it is obvious that *continuity* is essential, and in this connection every one of our readers can help, whenever anything having "news value" happens in their organisation. The receipt of orders of very large, or even microscopic, quantities is news. If they emanate from the Pitcairn or Christmas Islands, Tristan da Cunha, or Russia, that is news. If a foundryman, be he apprentice or chairman of directors, becomes famous in other activities—sport, politics, or literature—that is news. Winning new fields for castings, or the regaining of old ones captured by competing industries—that is news.

It might well be asked whether advantages will accrue through a co-operative effort to gain something more than respectability for our industry. Each one of us tries continually to raise, by all legitimate means open to us, the commercial and technical standing of our firms. Help is given in this laudable ambition if the standing of the whole industry be high. Quite often, only lack of money prevents parents from choosing either the legal or medical professions as careers for their children, because of the obvious social *kudos* of law and medicine. So, too, by enlightened propaganda, the foundry industry will overcome past prejudices and attract to itself in quantity the type of entrant one would like to see. Co-operative effort, directed to the dual ends of keeping the word "foundry" before the mass of the people and ensuring that, wherever possible, its prestige shall be enhanced, cannot fail to bear fruit for future generations of foundrymen.

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I.B.F. Golf Meeting

A Successful Event at York

The results of the Golf Meeting of the Institute of British Foundrymen, held last Friday at York, were as follow:—

Morning—Medal Round

I.B.F. Handicap Challenge Cup		*I.B.F. Scratch Tankard*	
1. F. Arnold Wilson	80 — 12 = 68	1. F. Arnold Wilson	80
2. G. W. Nicholls ..	84 — 10 = 74	2. G. W. Nicholls ..	84
3. R. C. Shepherd ..	88 — 13 = 75	3. E. A. Phillips ..	85
4. G. H. Clubley ..	90 — 14 = 76	4. P. B. Higgins ..	86
5. S. Unsworth ..	89 — 13 = 76	5. G. P. Tinker ..	88
6. H. W. Lockwood	95 — 18 = 77	6. R. C. Shepherd ..	88
7. P. B. Higgins ..	86 — 8 = 78	7. R. B. Templeton	88
8. E. A. Phillips ..	85 — 5 = 80	8. S. Unsworth ..	89
9. G. P. Tinker ..	88 — 6 = 82	9. G. H. Clubley ..	90
10. R. B. Templeton	88 — 6 = 82	10. R. S. Darby ..	91
11. R. S. Darby ..	91 — 8 = 83	11. H. W. Lockwood	95
12. A. Swain	101 — 18 = 83	12. A. Swain	101
13. A. G. Robiette ..	108 — 15 = 93	13. A. G. Robiette ..	108

Afternoon—Greensome Bogey Foursomes

1st, P. B. Higgins and G. W. Nicholls, 3 down (1st prize); 2nd, E. A. Phillips and A. Swain, 5 down (2nd prize); 3rd, R. B. Templeton and G. H. Clubley, 6 down; 4th, R. C. Shepherd and H. W. Lockwood, 6 down; 5th, R. C. Tinker and A. G. Robiette, 6 down; 6th, R. S. Darby and S. Unsworth, 6 down.

Under the rules of the Competition no one could take more than one prize for the morning round, and Mr. Arnold Wilson therefore elected to take the scratch prize.

This meeting was a very successful resumption of what is in future going to be an annual event, and a small sub-committee consisting of Mr. R. C. Shepherd, Mr. J. Bell and Mr. F. Arnold Wilson has been elected to make arrangements in good time for the 1949 meeting.

The course was in excellent order and the competitors were made most welcome by the York Golf Club, where the steward produced a gargantuan lunch and an excellent tea. The weather was perfect for golf in the morning, but in the afternoon some heavy showers of rain made conditions unpleasant, but did not damp the ardour of the foundrymen. The prizes were presented by Mr. P. H. Wilson at the Club House after tea. The two tankards which were won outright by Mr. Nicholls and Mr. F. A. Wilson, are most handsome trophies, and were given by Mr. P. H. Wilson and Mr. R. B. Templeton, Past-President and President respectively of the Institute.

Institute's New Section Meets

Wales and Monmouth Branch—West Wales Section. The first meeting of this session, held in Llanelly on October 1, attracted an audience of over a hundred. The lecturer was Mr. D. Robertson, of Bristol, and he described the making of a large and difficult casting in loam; the tackle required; the buildings; coremaking, closing and casting. The lecture was profusely illustrated with lantern slides. The secretary of the new section is Mr. D. Rogers, 3, Coronation Road, Llanelly, Carmarthenshire.

Forthcoming Events

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

OCTOBER 25.

Institution of Production Engineers.

Manchester Section :—Report on the Machine Tool Exhibition at Olympia, by H. Bentley, at the Manchester College of Technology.

Institute of British Foundrymen.

East Midlands Branch :—"The Lost Wax Process," by Mr. Short. Joint meeting with the Derby Society of Engineers, at the School of Arts and Crafts, Derby, at 6 p.m.

OCTOBER 27 to NOVEMBER 28

Exhibition of Industrial Design at the Royal Academy. Open 10 a.m. to 7 p.m. (See below.)

OCTOBER 27.

Institute of British Foundrymen.

London Branch :—"Production of Castings for Internal Combustion Engines." Film presented by C. R. van der Ben at the Waldorf Hotel, Aldwych, London, W.C.2, at 7 p.m.

Institute of Welding

Presidential Address by Dr. J. H. Paterson, F.R.I.C., at the Institution of Civil Engineers, Great George Street, London, S.W.1, at 6 p.m.

OCTOBER 28.

Royal Statistical Society—Industrial Applications Section.

Sheffield Group :—"The Activities of the Mathematics Division of the National Physical Laboratory," by E. C. Fieller, at the University, St. George's Square, Sheffield, 1, at 6.30 p.m.

OCTOBER 29.

The Institute of Metals.

Sheffield Local Section :—"Casting and Fabrication of Aluminium Alloys," by W. H. Whymper, at the Grand Hotel, Sheffield, at 6.30 p.m.

OCTOBER 30.

Institute of British Foundrymen.

Bristol and West of England Branch :—"Patternmaking," by S. A. Horton, at the Grand Hotel, Broad Street, Bristol, at 3 p.m.

"Design at Work"

The first exhibition of the work of Royal Designers for Industry will be opened by H.R.H. The Duchess of Kent at the Royal Academy on October 26. The exhibition, which is being sponsored by the Royal Society of Arts and the Council of Industrial Design, will be opened to the public from October 27 to November 28. By explaining the designer's place in modern machine production and marketing methods, the exhibition will demonstrate his contribution to the manufacture of products that work well, look well, last well and sell well. It is also intended that the exhibition shall be a useful forerunner to the centenary in 1951 of the Great Exhibition of 1851 by stimulating now the production of British goods of outstanding design in time for showing to the world during the 1951 Festival of Britain. In this connection, it is interesting to note that exactly 100 years ago, the Royal Society of Arts held one of a series of industrial exhibitions which led up to the Great Exhibition of 1851.

Aluminium Alloys. A new edition of Hiduminium Technical Data has been issued by High Duty Alloys, Limited, of Slough. The publication was last reviewed in our issue of July 10, 1947, page 234. The cover of the 1948 edition has been carried out in a brighter colour than was used in 1947; this is a distinct improvement. The earlier favourable impression as to matter and presentation is maintained.

Problems of Contraction and Distortion in Cast-iron Castings*

Practical Application to Large Castings

By E. Longden, M.I.Mech.E.†

(*Continued from page* 347.)

Stress Relief by Air Cooling

Example—Large Machine-tool Bed

The present-day tendency to emphasise the undoubted benefits of the stress relief of castings by heat-treatment must not be allowed to mask the more important need to reduce stresses by the introduction of more sensible designs. Early preventive measures by the designer, and the application of stress-relief expedients by the foundryman during the cooling down of the casting should be cultivated; indeed, with large castings, the application of heat-treatment, after the casting has cooled down, is often too late, since the stresses developed can actually be increased to a point of a destructive fracture.

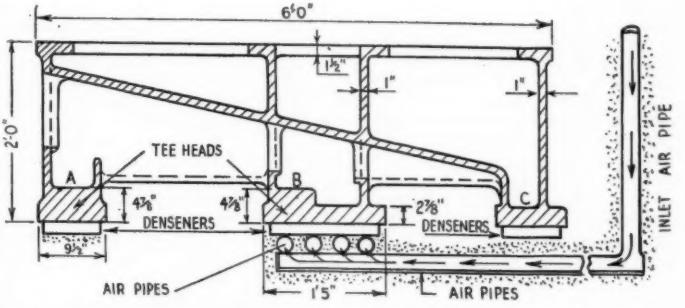


FIG. 7.—END ELEVATION OF MACHINE-TOOL BED CASTING SHOWING COOLING PIPES.

Figs. 7 and 8 show the general outline of a machine-tool bed, weighing 16 tons, the dimensions of which vary in some particular section with each order, and variations are apparent from one manufacturer to another manufacturer at home and abroad. There are no constants except the constant of vigilance on the part of the foundryman.

It will be noted on examining Figs. 7 and 8 that the bed casting carries three slideways of considerable length, each slideway differing in dimensions. The middle slideway is very massive with a section equal to 90 per cent. of the two outer slideways added together. Contrasts of an extreme nature also exist between the slideways and the rest of the casting sections.

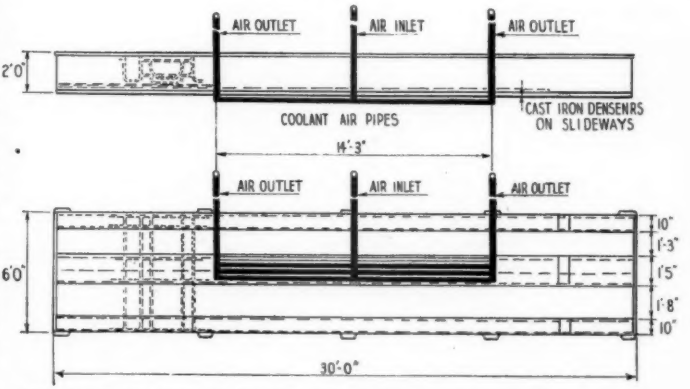


FIG. 8.—PLAN VIEW OF MACHINE-TOOL BED CASTING AND PIPE LAYOUT.

The principal complications of the design are: There is great difficulty in selecting a metal which will yield the necessarily close-grained wear-resisting structure and freedom from local porosity about the hot spots on the slideway surfaces. Such a metal as would suit the metallurgical requirements of the slideways would create a hard brittle metal in the thin sections of the casting, thereby increasing the danger from excessive distortion and fracture. Hence, a densening technique is applied to the comparatively heavy slideways permitting the use of a grade of metal which favours a grey-iron structure in the thin sections of the casting.

*Presented at the London Conference of the Institute of British Foundrymen, June, 1948.

†Works Manager, P. R. Jackson & Company, Limited (David Brown Companies), Salford, near Manchester.

Contraction and Distortion of Castings

This may be considered as a compromise so far as metal is concerned.

The varying sections of the slideways demands varying counter-balancing cambers in the same casting. although one slideway influences the bending or distortion of the remainder of the casting.

Differing rates of heat transfer from the central areas of the lower face of the casting, as poured, inevitably, will create stressed material due to strain set up by the differing heat gradients with the consequent distortion and, possibly, fractures. Without much of the preventive measures, gained empirically, the casting would be a very unstable mass of cast iron and could, very well, result in a destructive fracture. The probable lines of fracture could be forecast.

With castings similar to Figs. 7 and 8, it had been previously necessary to counter distortion to the extent of a concave camber allowance on the line of the slideways as follows:—A, 1.35; B, 1.60; C, 1.20, indicating conflicting stresses.

TABLE II.—*Comparative Amount and Rate of Contraction.*

Rate of contraction—hours.		Total contraction in thousandths of an inch.	Per cent. standard.
Grey iron.			
A—1½ in. bar in	70	3.764	−100.4
B—3 in. bar in	120	3.630	− 96·8
C—6 in. bar in	165	3.472	− 92·6
White iron.			
B—3 in. bar in	80	6.324	− 84·3
C—6 in. bar in	135	6.286	− 83.8

Air-cooled Slideways

Such conditions referred to in the foregoing notes compelled the Author to adopt the stress relieving of the casting during the cooling down from solidification whilst it was still in the mould. This was successfully accomplished by introducing air-cooling to the central area of the middle slideway, B.

It was calculated that bending from distortion would be reduced from 30 to 40 per cent. of previous requirements, and that the casting would be relieved of so much stress as to remove all danger of a destructive fracture and much of the tendency to creep changes after machining. Table III shows a comparison of the camber experienced without air cooling, re-calculated for air cooling and the actual camber obtained with air cooling on each length of slideway.

The system of air cooling, as illustrated in Figs. 7 and 8, show that air pipes were located, during the mould building, below the surface of the middle slideway, B, and extended for a length of 14 ft. 3 in. of the central area which normally constitutes the most slowly cooled area of the casting. The inlet and outlet pipes were located at right angles to the slideway coolants.

It will be noted that the air pipes were in immediate contact with the metal of the denseners (high heat conductivity). Within 5 minutes of the end of pouring operations, air was admitted to the air-cooling system. The exhaust air temperature was checked at intervals over a period of 12 days. It reached its maximum temperature of 110 deg. C. in 8 hours.

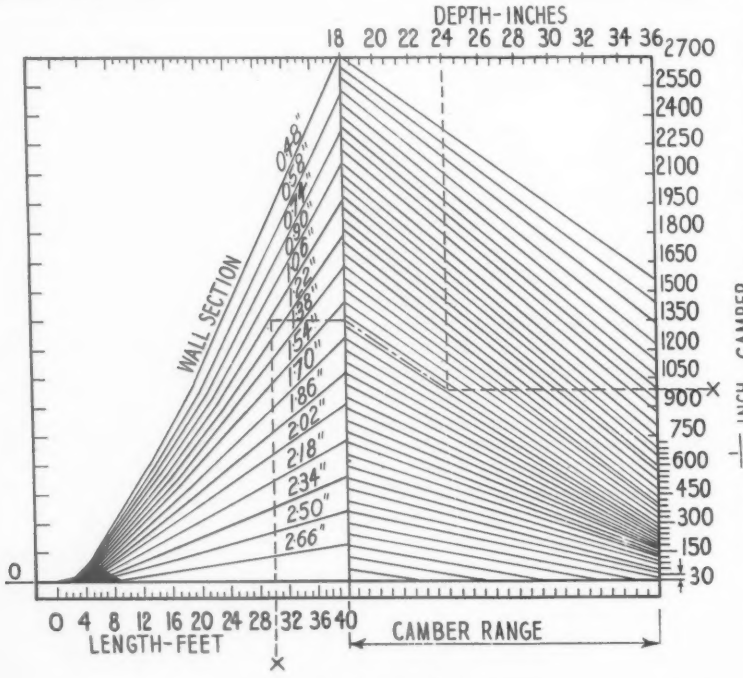


FIG. 9.—CAMBER GRAPH.

TABLE III.—*Camber Allowances.*

	Inches.		
	A.	B.	C.
Previously allowed	1.35	1.60	1.20
Calculated for air cooling	0.95	1.00	0.90
Actual recorded—air cooled	1.10	1.05	1.00

Because of the intervention of a holiday and other interferences, a complete record of the cooling behaviour of the casting was not secured, such incomplete records are, therefore, omitted except for contraction, which was properly recorded. The final contraction on the air-cooled casting compared with a previous casting of similar design, but 1 ft. 6 in. shorter, is illustrated, expressed as percentage of length and standard contraction allowance, as shown in Table IV.

TABLE IV.—*Percentages Contraction of Slideway Castings, as Related to Standard.*

	A.	B.	C.
Not air-cooled	91.9	90.5	92.3
Air cooled	92.3	92.9	92.1

With the bed under consideration, it is quite common to find that the end vertical wall at the end of the middle slideway is concave to the extent of ¼ in., indicating that the middle slideway has contracted last and has been compelled to draw-in the end wall to take up its final contracted length. If this does not happen the middle slideway must fracture.

Camber Graph

The camber graph, Fig. 9, has been designed to serve a large range of castings within the classification of beds, bedplates, tables and similar castings. The example of the four-slideway machine tool bed, illustrated in Fig. 10, is taken as the basis of the graph. The camber requirements will vary little if the casting be a two- or three-slideway bed so long as there is a corresponding reduction in the width of the casting, although camber is increased slightly on beds carrying middle slideways—chiefly on the middle slideways.

It will be noted that the graph is arranged in two divisions. The left-hand division takes care of the length and vertical sectional thicknesses of the casting and the right-hand division the depths and camber scale. The graph is based on the main vertical longitudinal wall section being of 1.0 in. to 1.1 in. and the lower faces (as poured) carrying metal sections equivalent

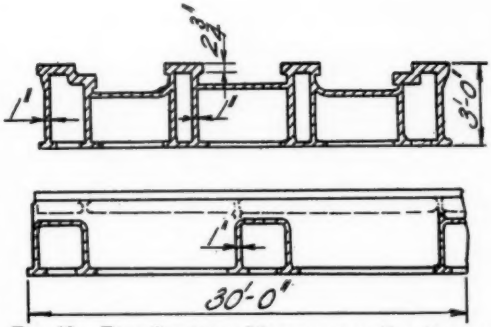


FIG. 10.—FOUR-SLIDEWAY MACHINE-TOOL BED CASTING OF THE TYPE TO WHICH THE CAMBER GRAPH (FIG. 9) APPLIES.

to between 250 to 300 per cent. of the vertical sections and covering from 40 to 50 per cent. of the area of the bottom face of the casting, as poured. Any reduction in the vertical wall section calls for an increase in camber allowances. A thickening of the wall sections requires a corresponding reduction in camber allowances.

The curves on the graph are plotted from information and records obtained from a large variety of cast-

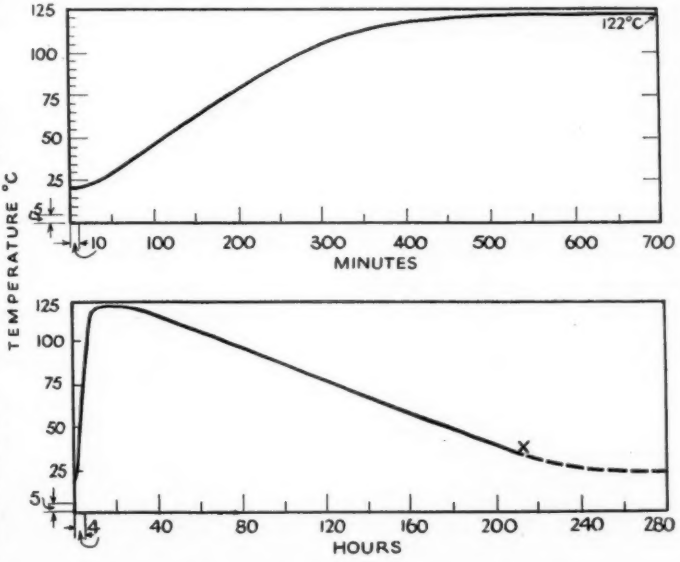


FIG. 11.—TEMPERATURE OF AIR FROM COOLING SYSTEM.

Distortion of Castings

ings produced over a long period of years. The scatter points were not wide and the graph is workable within very reasonable and safe limits. At the lower end of the scale, it will be noted that camber requirements can be progressively ignored as length diminishes, especially about the shaded areas. Camber requirements are not just an automatic increase with an increase in length. An examination of the graph will show that there is an acceleration in the rate of increase with increasing length.

It will be realised that from the castings with thinnest vertical section walls to the thickest section castings there will be adjustments made in the composition of the metal to suit the main sections. So that when the vertical-wall sections reach a similar dimension as, say, a slideway the problem of the choice of suitable metal is of easier solution than in the case of the casting shown in Fig. 7, 8 and 10.

How to Use the Graph

Example: Find the camber required for a bed 30 *ft. in length,* 24 *in. in depth, and with* 1.06 *in. vertical-wall sections.*

From X, 30 ft., strike a vertical line until it joins the wall section of 1.06 in. From this point draw a line at right angles until it meets, or is guided by, the first diagonal camber line and trace it down until it joins the vertical line descending from the 24-in. depth point.

Answer: Camber needed 0.99 in.

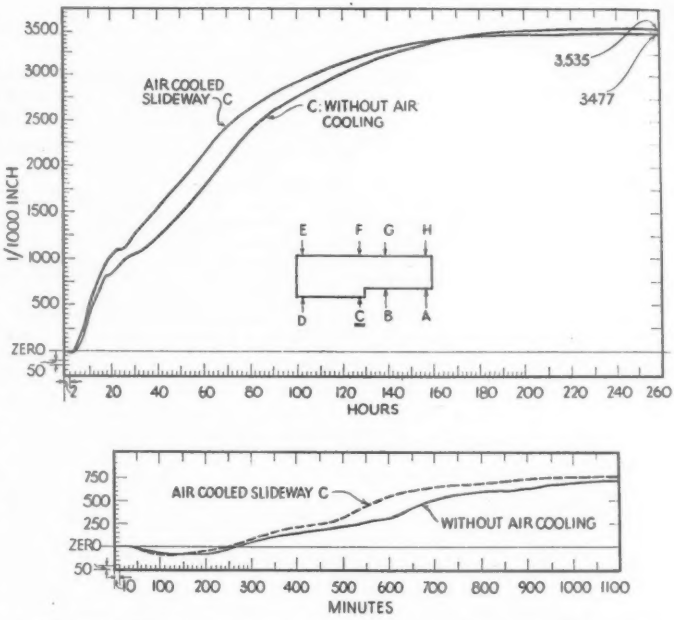


FIG. 12.—COOLING CURVES OF TOOL-BED SLIDEWAYS, WITH AND WITHOUT AIR-COOLING. CONTRACTION EXPRESSED AS PERCENTAGE OF STANDARD:—AIR-COOLED (AT 3,477) 92.8, WITHOUT AIR-COOLING (AT 3,535) 94.2.

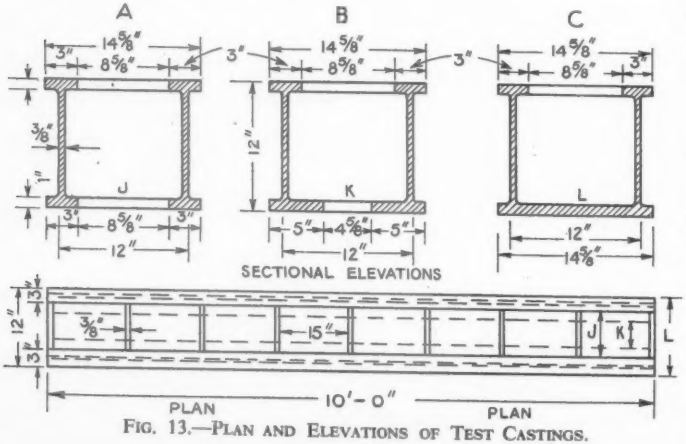


FIG. 13.—PLAN AND ELEVATIONS OF TEST CASTINGS.

Generalisations on Camber

The following additional rules may be used in conjunction with the camber graph, Fig. 9.

Camber allowance increases with an increase in the length of a casting, other dimensions remaining constant:—

(1) Camber allowance increases with a reduction in metal section of the vertical walls of the casting.

(2) Camber allowances are reduced with an increase in the depth of the casting, without any corresponding increase in the length.

(3) Camber allowance is slightly decreased with a reduction in width.

(4) Camber allowances increase with an increase in the plated area

on the lower face of the casting as poured.

(5) Camber allowance increases with an increase in the section thickness of the metal on the bottom face of the casting.

(6) Camber allowance decreases with an increase in the plated area on the top side of the casting as poured.

(7) Camber allowances are modified slightly with pouring temperature, allowances increasing slightly with lower temperatures.

Conclusions

It may be deduced from the information submitted that, in grey-iron castings of contrasting sections, or of varied cooling gradients, the thicker members, of the castings referred to, contract by a greater percentage than the thinner members. If, however, the same contrasting sections be cast as simple, uniform and separate items, contraction is in line with standard allowance—that a thin section of grey iron contracts more than a thicker section for the same composition.

In the case of a casting carrying thick and thin sections, the thin, or comparatively light sections, are subjected to an extensional stress, during the cooling of the metal, created by the resistance of the thicker sections which are not yet contracting (indeed they may be actually expanding). The frictional resistance of the mould and cores, and the expansion of the cores on being heated by the molten metal, will also tend to subject the cooling metal to extensional stress. A study of the very clear arrest and expansion periods noted on the cooling curves indicates that a thick section of a casting may be undergoing an expansion at a time when a thinner section has passed its expansion phase and is in a state of contraction. Under these conditions the thin sections will suffer extensional stress. Conversely, the thicker sections will be subjected to a compressional stress by the effort of the earlier-cooled members to contract. Finally, the heavy sections, on cooling, must take up a shorter length by bending certain parts of the casting, or by fracture in the weakened or most highly-stressed sections.

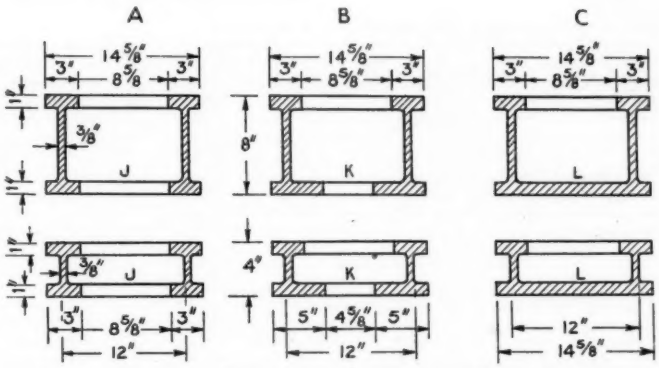


FIG. 14.—SECTIONAL ELEVATIONS OF ADDITIONAL TEST CASTINGS.

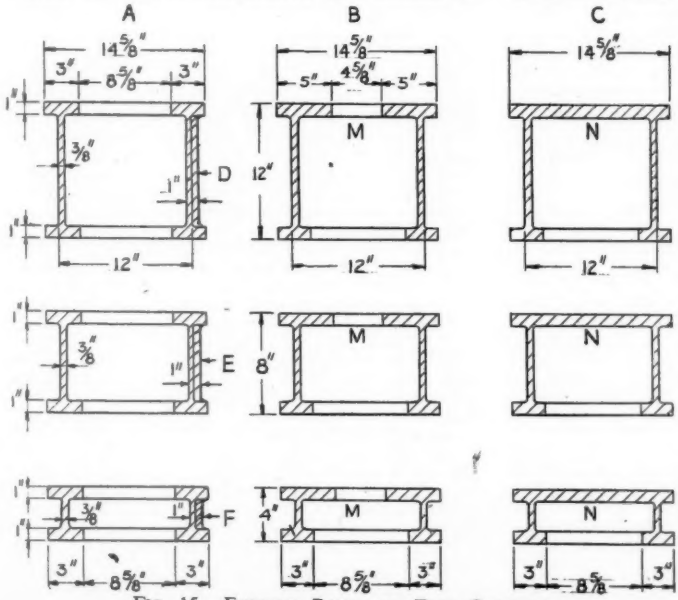


FIG. 15.—FURTHER RANGE OF TEST CASTINGS.

The introduction of an air-cooling system to accelerate the cooling rate of the zones of the casting with a high heat content is of obvious benefit in reducing stresses and removing the need for such high camber allowances. This innovation is applicable to a variety of castings which present unusual and contrasting heat gradients. Whilst it is difficult to provide universal camber standards, the camber graph illustrated in Fig. 9. with the accompanying qualifying notes, provides a basis for the

Contraction and Distortion of Castings

solution of many camber problems over a very wide range of castings.

APPENDIX*

Fig. 11 shows the temperature of the air exhausted from the air cooling system.

Fig. 12 indicates the cooling curves of heavy machine tool bed slideways when air cooled and without air cooling.

Large Test Castings

Figs. 13, 14 and 15 illustrate a series of test castings designed to provide further precise information in respect to the influence on contraction and distortion of contrasting depths and sections. The depths, A, B, C, varied at 4 in., 8 in., and 12 in. respectively. Fig. 13 shows a plan of the test casting and cross-sectional elevations are indicated in Figs. 13, 14 and 15. The metal on the bottom face of the castings varied as at J, K, L. The upper face varied as shown at M and N and on one side wall as identified by D, E and F.

The composition of the metal, total carbon 3.31, silicon 2.13, phosphorus 0.70, manganese 0.64 and sulphur 0.10 per cent., showed a carbon and silicon content arranged to yield a metal structure such as might be obtained in more massive castings with lower percentages of these elements. The results of the tests are shown in Tables V and VI.

The influence of the added metal to one of the vertical walls of the castings, shown at D, E and F, Fig. 15, are as follows:—

D—concave sideways 0.13, E—concave sideways 0.12, F—concave sideways 0.05.

*A communication received from the Author after presentation of the original Paper at the London Conference.

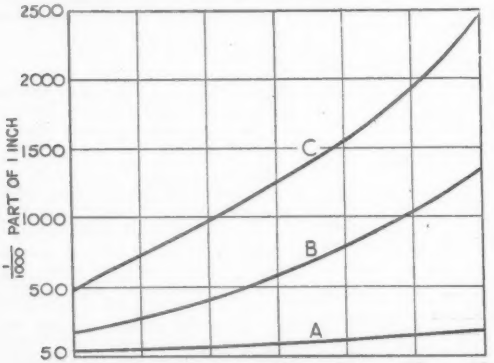


FIG. 16.—GRAPH SHOWING COMPARATIVE CAMBER ALLOWANCES.

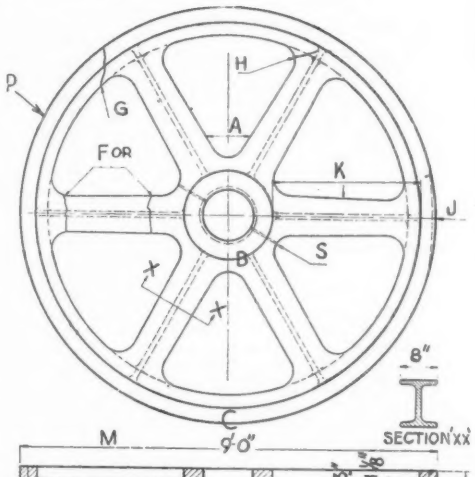


FIG. 17.—TYPICAL GEAR-BLANK CASTING.

It will now be clear that the heavier sections, of the class of casting referred to, contract last and, in taking up the shorter length, bend the weaker members of the casting, but the resistance offered by the shape of the casting in turn restricts the shortening of the thick members which bend inwards—thus the thick member becomes concave. The amount of bend may now be converted to camber required—a bending in the opposite direction.

As a check on contraction, two test-bars, 10 ft. in length, were poured in metal of similar composition to that used for the test castings, Figs. 13, 14 and 15, and the following figures were recorded:—

10 ft. × 6 in. × ½ in.—contraction 1.410 in.
10 ft. × 6 in. × 1 in.—contraction 1.385 in.

It is shown that contraction in the cored castings, outlined in Figs. 13, 14 and 15, is hindered when compared with the simple bar castings which have more freedom to contract.

Fig. 16 is a graph indicating the comparative amounts of counteracting bends (camber) needed in large castings based on the tests shown in Figs. 13 and 14 and collected data from experience with castings requiring careful consideration in respect to cambering requirements.

Steel and Iron Castings Compared

Fig. 17 shows a sketch of a typical gear blank casting, 9 ft. diameter, which may be made in steel or cast iron. The casting consists, essentially, of a boss, B,

arms, A, and rim, C, from a study of which it will be noted that the cooling rates of the members of the casting vary considerably. The order of cooling will be, first the arms, secondly the rim, and lastly the boss. Such a combination of sections introduces the hazards of fractures in the arms and possibly in the rim. The margin of safety is not always of sufficient magnitude to avoid the occasional defectives which appear when variation of design, mould and metal may combine to produce a failure in the casting.

The stresses present in a large heavy casting may be explained by an examination of the sketch, Fig. 17. The type of fractures indicated by F, G and H may occur in either steel or iron castings, but happen most frequently with cast iron unless certain expedients are employed. The difference in behaviour of the two metals would appear to be due to the constitutional differences in the two alloys. Cast iron is comparatively brittle and can be much stressed from the dual expansion and contraction strains which are operating, probably, simultaneously in the same casting. The stresses in steel are of more direct or one-way effect. The contraction on the arm, K, at 0.4 in. is of a higher percentage to the total contraction of the casting when made in cast iron than it is with a contraction of 0.7 in. with a steel casting.

TABLE V.

Convex	Depth, 4 in.			Depth, 8 in.			Depth, 12 in.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.
Distortion	0.05	0.12	0.36	0.03	0.18	0.46	Nil	0.01	0.03
Contraction 1/1,000 in.	1,258	1,260	1,255	1,254	1,247	1,246	1,247	1,240	1,236
Average contraction		1,257			1,249			1,241	

TABLE VI.

Concave	Depth, 4 in.			Depth, 8 in.			Depth, 12 in.		
	A.	B.	C.	A.	B.	C.	A.	B.	C.
Distortion	Nil	0.05	0.02	Nil	0.01	0.10	Nil	Nil	0.01
Contraction 1/1,000 in.	1,254	1,254	1,253	1,250	1,249	1,246	1,242	1,239	1,238
Average contraction		1,254			1,248			1,239	

The energy required to break the arm if made in grey iron with a section as shown at XX, Fig. 17, will be of the order of 450 tons in tensile. To break a steel casting of similar section would require about 1,150 tons tensile stress. Steel will respond to elongation. Cast iron has little or no property of elongation. It may be realised that the contraction stresses are of a high order in such cases referred to.

The effective strength and elasticity of steel results in a flattening of the rim opposite the arm end (as indicated at J in Fig. 17) instead of a fracture. In this case the arm has had sufficient strength to pull in the rim to accommodate its contraction. In a 9 ft. diameter blank casting this flattening may exceed a ¼ in. in depth from the radius line. Subsequent stress annealing stabilises this distortion of the shape of the casting. With cast iron the strength of the arm is insufficient to bend the rim to accommodate its contraction if the heat gradients vary as stated in the example.

The remedy to casting stresses lies in accommodation of design to not only favour an equalisation of casting section but rather to favour the cooling rate to suit the heat gradients in the mould. Failing such accommodation, it is necessary to bare the bore, D, Fig. 17, and the faces of the boss immediately after solidification so that it may contract slightly in advance of the arms and rim. The safe order of shrinkage would be: boss, arms, and, lastly, the rim.

A split boss, as indicated at S, Fig. 17, may be introduced as a mechanical convenience, but it is very welcome to the foundryman since it relieves him of the contraction hazards referred to.

DISCUSSION

MR. J. E. MERCER asked Mr. Longden, in connection with steel wheels, if he had tried the staggering of the arms, that is, an unequal number. This would prevent the arms being opposite each other, which was a cause of "hot-tears," and also, on large wheels, of deformation of the periphery.

MR. LONGDEN replied that he had occasionally been able to secure such an improvement in the design—there would be less stress on the casting by the staggering of the arms—but he felt the need to point out the difference in the behaviour of a steel casting as compared with a cast-iron casting.

MR. B. HIRD congratulated Mr. Longden and referred to the electrlic jolting apparatus which was described in the Paper as being applied to castings in the United States in order to relieve strains; he asked if Mr. Longden considered that a plain jolt ramming machine would achieve a similar effect if a casting could be fixed to it and could be given a series of jolts. Mr. Hird mentioned it because, a good many years ago, Dr. Moldenke had suggested in "The Foundry" that this method might be applied for the relief of strains in castings.

MR. LONGDEN replied that, although he had referred in the Paper to the electrical vibrating mechanism

Distortion of Castings—Discussion

method being used by the Americans, he had not very much conclusive information about it. But he must suggest that it would be far safer to adopt the American method rather than to place a casting on a jolting machine, where there would be direct impact with the table of the machine. He felt that jolting of the casting when it was suspended was much kinder to it and less liable to produce the effects of metallic impact, which latter might bring about fracture of the casting.

An Unsolicited Testimonial

MR. COLIN GRESTY complimented Mr. Longden on his very practical Paper and assured him that the Institute was very much indebted to him for having given the benefit of his experience. It was not always appreciated, he said, what a great deal of courage was needed to experiment with castings which might be worth hundreds of £'s each. Mr. Longden had mentioned quite casually that sometimes it was an advantage to bare the surface of a particular part of a casting. He had only to make a very small error of judgment, however, and that casting at once became a waster. In the foundries with which Mr. Gresty was connected, Mr. Longden's earlier published work had proved very valuable on many occasions.

A very interesting case had arisen two or three years ago, when there was an acute difference of opinion in the foundry, and particularly between the foundry and the patternshop, as to which way a casting would contract. It was not of the exact type that Mr. Longden had discussed in his Paper, but it was a long bed casting, and the question was which way the camber should be set. Ultimately the matter was referred to Mr. Longden's judgment, by way of referring to his previously published work; adopting the suggestions therein, they had made about 10 of these castings and they were all perfectly straight. It was a tribute to his work, that it was of real practical value in the heavy casting foundry.

MR. G. W. NICHOLLS, Halifax, endorsing Mr. Gresty's expression of thanks, said that having made, some time ago, a research into the literature on those very problems, he had been very much impressed by the fact that in all cases the point was made that much could be done by the designer himself in co-operating with the foundry executives. Mr. Longden had made the same point; and one might suggest that if, after 25 or 30 years, the foundrymen were still asking for further or fuller co-operation from the designers, Mr. Longden's Paper might well be published, not only in the FOUNDRY TRADE JOURNAL, but also in all the engineering journals.

Recalling a reference made in the Paper, to the casting of heavy castings with two ladles of metal, Mr. Nicholls said he had tried it for a purpose other than to deal with contraction, but had been unsuccessful in obtaining a distinct line of demarkation between the two metals. He asked, therefore, how Mr. Longden would run a casting in order to obtain the two layers of metal.

The Paper was the first he had seen in which an attempt had been made to put forward a method of readily calculating the camber of heavy castings; and for himself and other foundry executives in the heavy castings industry, he voiced thanks to Mr. Longden, particularly for the camber graph, Fig. 9.

Next, he asked what were the effects of side projections on the type of castings Mr. Longden had illustrated, both on the camber and the off-setting of the camber from the centre. What effect on camber had the air-cooling of the heavy slide-ways, which Mr. Longden had illustrated? Also, how did he apply his graph to the calculations of four separate cambers in the example he had shown of four flat slide ways.

Finally, with regard to Mr. Longden's reference, in connection with stress-relieving, to temperatures of 400 to 700 deg. C., according to type of alloy, Mr. Nicholls asked what type of alloy would require a temperature of 700 deg. C.

Use of Varying Metal Compositions

MR. LONGDEN said it was true to say that one could search foundry technical literature in vain for some aid in determining the countering of distortion by cambering in large castings; indeed, in his early experience, what information had existed seemed to be wrong. The pouring of two different qualities of metal into a casting in an attempt to reduce distortion was not difficult if one had the facilities. For instance, a heavy bed carrying a 3 in. section in the slideways might require a silicon content of about 1 per cent. to ensure freedom from porosity. The vertical walls, at 1 in. thick, would require, probably, 2 per cent. silicon to ease the distortion effects. Metal was poured into the mould at one end at the lower face level from one ladle, and the pouring was completed at another area of the mould at a higher level, or it was drop-poured through a vertical section midway in the casting.

With regard to side projections in the case of the bedplate he had illustrated, it was indicated that along one side there was a pad of metal running nearly the whole length of the casting; it tended to pull and bend the casting sideways, and in that case ¼ in. camber was allowed sideways as well as the downwards camber referred to in the Paper. If the modifying notes were studied in conjunction with the camber graph he was sure Mr. Nicholls would obtain the information he required as to what should be done in the case of projections, side lumps and pads of metal. The additional metal would slow up the rate of freezing and cooling and would consequently produce similar stressing effects and bending tendencies on the part of the casting to which they were attached, as in the case of the slideways.

The different cambers for varying depths of casting were certainly calculated on the basis of existing knowledge. A shallow area would pull and distort more than the deeper sections, and, of course, one must modify the standard allowances according to the positions of the inner areas of the casting and the condition of the mould. Again, the modification notes indicated that there would be a slower rate of cooling for the inner slideways or inner areas of the casting, due to the slower conduction of heat from the central areas. The camber graph would provide all the information necessary to meet all the variables referred

to by Mr. Nicholls in respect to the centres of the slideways being offset from the body of the casting.

Stress-relieving temperatures for cast iron castings would depend, of course, on the classes of castings and the duties they had to perform. He would not suggest, for instance, that one should stress-relieve a Diesel engine cylinder at 700 deg. C., for one must wish to retain the as-cast properties of the metal, and at 700 deg. C. there might be a fairly considerable change in the structure. Indeed, at superheated steam temperatures a change was brought about in the structure of cast iron. But an alloy or high duty cast iron for certain classes of castings would require a temperature somewhere in the region of 650 to 700 deg. C. to achieve the maximum of stress relief. A soft cast iron could be stress relieved at a much lower temperature.

Added Responsibility

MR. H. J. YOUNG (Member) said this Paper touched upon a delicate matter, namely, that designers be brought, or taught, to collaborate with those who took responsibility for bad castings. He (Mr. Young) had never found a solution to this other than that one where mutual friendship and trust automatically rendered collaboration advisable and fruitful. If a casting gave such wastage that the foundryman was impelled to call in the designer, by so doing he ran certain risks, as for example the designer might ask what alteration the foundryman wanted, thus fixing the onus more firmly upon him than before. He was not referring to intricate castings the intricacy of which was essential, but to those which, by reason of unbalanced design (often caused by the gradual enlarging of sizes as years passed) were liable to take camber, to distort or crack in the mould, dressing shop, machine shop or in service. A lifetime of ironfoundry practice had shown that, generally speaking, the foundryman was the only individual upon whom responsibility was fixed when disaster of magnitude occurred. This Paper was based upon Mr. Longden's long experience of certain designs, and foundrymen would apply it whilst taking that fact into due consideration. On the other hand, a designer might claim that as he had followed out the Paper's recommendations, any numbskull ought to be able to make the casting without camber, distortion or cracking, and he (Mr. Young) thus advised against this Paper being recommended to engineers as a kind of *vade mecum* on design. In saying that, he was not decrying its value, which was great, but trying to prevent a further shackle being forged for the man who took responsibility when castings failed.

MR. G. W. NICHOLLS, recalling the question he had put to Mr. Longden earlier concerning side projections and the positioning and depth of camber at the centres, said that in the case of a long lathe or planing machine bed one applied camber at the centre point; but often there were side projections which necessitated placing the deepest point of camber off centre on the length of the casting. He wondered whether Mr. Longden's experience had yielded sufficient data for him to be able to give a further graph showing correction factors off centre for varying side projections.

Commenting on Mr. Young's reference to the attitude of designers and engineers, he said that in the literature it was often stressed that the designer knew nothing about casting; and he agreed with Mr. Young that, if anything went wrong, the foundry was always responsible. Literature of the last 30 years all made the same argument, that the designer would throw at the foundry some design which it was not practicable to mould; that the designer had not the practical knowledge of cooling rates, and so on, but Mr. Nicholls pleaded for more co-operation, such as passing on to the engineers information such as Mr. Longden had given, so that the engineers could help in the future to reduce or eliminate some of the foundry problems. He mentioned a case in which a 15-ton casting, 25 ft. long, had been treated in such a way in the engineering shop that the locked-up stresses had been sufficient to cause the casting to break in two. The engineers had no idea of locked-up stresses and so on; and again he urged that Mr. Longden's Paper should be published in the engineering journals to bring engineers more closely in touch with the problems of the foundry.

Post-graduate Education

MR. MATTHEW SEAMAN, M.Sc., speaking as an engineer who had had to spend a considerable amount of time in foundries, put forward a point of view and a suggestion. Many foundry problems, he said, were not understood by engineers and were not understood fully by foundrymen; these occurred at what he would call, for want of a better term, the "post-graduate" level. There had been a lack of a good post-graduate course in important foundry problems for foundry managers and designers who had had considerable experience at the graduate level as foundrymen, metallurgists and designing engineers.

Therefore, in the North-West they had taken the trouble to organise a course in foundry management and technology for next session; and the man who was to "open the batting" on the foundry side was Mr. Longden. It was very pleasing that that was so; and the need for this course had been very strongly supported by the discussion on Mr. Longden's Paper. Whilst the course was intended primarily at post-graduate level for foundry managers and technologists, he hoped it would attract designers also. The endeavour was that the lectures would deal with leading points which would ensure that experienced designers would learn a good deal more about foundry problems, and that the co-operation between the two sides would be very much improved thereby.

THE CHAIRMAN, Mr. J. J. Sheehan, in an expression of thanks to Mr. Longden for the Paper, said he was grateful also for the discussion and felt that the matter of training and co-operation with the designers should be followed up. He personally had the feeling that perhaps the designers were blamed a little too much because, quite frankly, if the foundryman were given his own way all the time—and he himself was a foundryman—he would make only the easy castings, and the complicated Diesel heads, and so on, would never have been made because they would never have been designed. The foundryman was ingenious and, as Mr. Longden's Paper had shown, he would find a way to do a job; but, the Chairman concluded, with an appeal to the engineering designers—Do not make it too hard too soon.

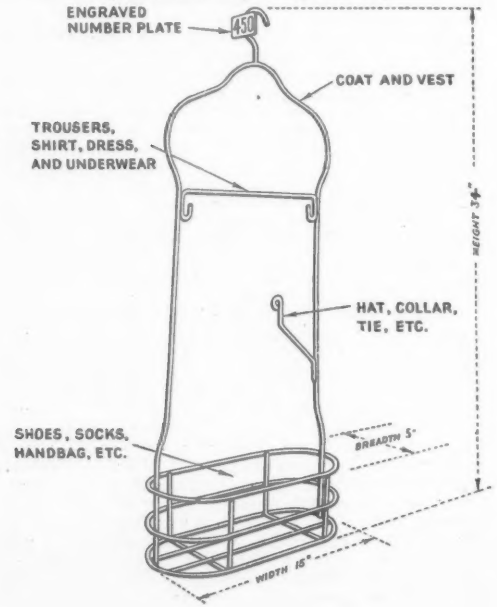
Hygienic Cloakroom Storage

Amongst the main difficulties facing executives to-day dealing with problems of storing employees' clothing are:—(1) Utilising factory space which can ill be spared; (2) facilities for drying wet garments to prevent illness and absenteeism; (3) meeting fully the provisions of the Factory Acts, and (4) costs of installation and maintenance. A new system of clothes storage, the "Hy-Gard-All," patented and manufactured by James Sieber Equipment Company, Limited, Africa House, Kingsway, W.C.2, goes far to solve these problems. The unit consists of numbered separate steel hangers suspended from steel frames, which may be arranged in single or double tier installation. In this way, the space required is reduced to a minimum.

The drying of wet garments and the general airing of clothing is carried out in nature's way, by the free passage of air around and through the garments as they are hung and spread out on separate portions of the hanger. The continual movement of air prevents the musty unclean atmosphere usually associated with cloakrooms, and which is particularly noticeable where lockers are used for clothes storage. It is assumed that by using this new cloakroom equipment the general health of the operatives is maintained at a high level by avoiding the common cold so frequently caused by donning wet or damp garments. The correct shape of garments is also retained.

The hangers are manufactured from galvanised steel rods electrically welded, and are suspended from frames

(*Concluded at foot of Col.* 2.)



The Wedge Runner

By "Tramp"

Many castings can be run in a variety of ways, but others are only produced successfully when a specific type of runner is used. Such a case is shown in Fig. 1, which depicts a particular type of oil-bath cover. The groove A running completely around the casting makes it difficult to run with an ordinary cut-in runner at the side because of the possibility of the erosion of the sand which forms the ridge. The thickness too, further complicated matters, as, unless very fluid metal be used "cold shuts" are quite liable to be formed.

Covers of this nature are best cast in the position shown in the illustration by means of a "wedge" runner, situated on top, thus ensuring the complete running of the casting despite the thin section metal.

Occasionally, thin manifolds are produced by means of a wedge runner on the flange portion, and the resultant castings are far superior to those run by means of a cut-in runner, in respect to both appearance and their ability to withstand the hydraulic-pressure test.

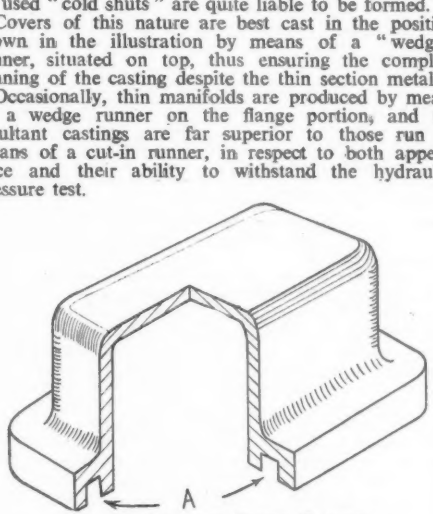


FIG. 1.—OIL-BATH COVER CASTING.

New Catalogue

High-strength Heat-resisting Alloys. "The Nimonic Series of Alloys—Their Applicaton to Gas Turbine Design" is the title of a brochure just issued by the Mond Nickel Company, Limited, Grosvenor House, Park Lane, London, W.1. This pamphlet, using well-written letterpress and clear illustrations, places before the designer data of a type selected to assist them in the best use of these alloys, bearing in mind the arduous service conditions involved.

of steel tubing. With normal use the system is indestructible.

The "Hy-Gard-All" cloakroom equipment fully meets every provision of the Factory Acts. Our illustration (left) shows details of a unit, whilst Fig. 3 of our article* on British Bath-making Practice shows an installation in a modern foundry.

*See page 131 issue of August 5, 1948.

A Review of Progress

Mr. John Hird's Presidential Address at Birmingham

The Birmingham, Coventry and West Midlands Branch of the Institute of British Foundrymen at the opening meeting of the session heard Mr. John Hird deliver his inaugural address, in the course of which he said:—

Mr. Harrison and Gentlemen, The Presidential Address is traditionally an opportunity for the Branch-President to address the Branch on a subject which he feels will interest his audience, and generally one on which he has definite views.

I am fortified with the knowledge that my address is not open to discussion, but alarmed by the long line of excellent addresses my predecessors have given, going back to the time when the Birmingham Branch was the whole Institute. I have taken as my subject "The Increase in Facilities for the Distribution of Knowledge in the Foundry Trade during the last 50 years, and the need to take every advantage of them in the future." The fact that such increases have kept pace with practical developments is a justification of our motto "Science hand in hand with Labour."

Value of Publicity

This dual progress is increasing in tempo, and to my mind dates back to 1885 when Professor Turner of Birmingham University first produced his Paper on "The Effect of Silicon in Cast Iron." It took some years for this theory to become widely known and generally accepted. By elucidating the influence of silicon in cast iron, Professor Turner gave the key to the successful application of scientific knowledge in the ironfoundry. This appears to have started foundrymen realising how little was known about cast iron, and how much there was to know. The effect of elements and the combination of elements in cast iron are still being discovered.

The FOUNDRY TRADE JOURNAL was first published in 1902. It then had a circulation of a few hundred. This has now grown to many thousands, some 40 per cent. of which go abroad. It has kept foundrymen informed on new methods and theories, with first monthly and, since 1921, weekly publications of news and views for 46 years. This service to the foundry industry has been, and is of incalculable value in the spreading of knowledge. It is of interest to note that in the second issue of the FOUNDRY TRADE JOURNAL, February, 1902, there is a letter from a gentleman* in London signed "Foundryman," suggesting the formation of an Institute of Founders, and an editorial note saying that the Editor thought this an excellent suggestion, and opening the column for the free discussion of the subject. Also, in the same issue, is a letter from a foundry foreman suggesting the formation of an association or club of some sort. Incidentally, the Americans had a 10-year start on us by publishing their "Foundry" in 1892, although the "Iron and Steel Trades Journal," which the FOUNDRY TRADE JOURNAL incorporated, was started in 1849, and is probably the oldest publication in the world to deal with metals.

It is only natural that foundrymen, having acquired a means of publishing articles on foundry work, felt the need to discuss them, and the formation of the Institute of British Foundrymen followed in 1904: the Institute then being known as the British Foundrymen's Association. The speed of the development in foundries has been directly proportional to the size and membership of the Institute which, in 1908, was 320 and is now over 4,000. The Institute has enabled foundrymment to get to know one another, and in knowing one another to realise that no one is encyclopædic, and all can learn from one another.

Need for Co-operation

When the foundry develops a new method and passes it on to another foundry, it is almost certain that in the second foundry the process will not be developed on quite the same lines. In short, the pooling of scientific knowledge is not a loss to the individual who contributes, but the information accumulated becomes a benefit to the industry as a whole, increasing the store of knowledge available to everyone within the industry.

With keen buying returning in the not too far distant future, the more co-operation there is within the foundry industry the less is the risk of prices being sliced down to the ridiculous extent they were during the last depression, when foundries were so short of capital that they could not progress and develop, and we were told the working conditions were bad and plant was out of date. We must not let this happen again. Competition is desirable; it is the father of invention if necessity is the mother, but surely it should be the competition of castings *v.* plastics or castings *v.* stampings, forgings, pressings, and weldings. If the foundry industry will get together, pool its problems and its knowledge, then it will be able to develop and modernise to meet this competition with a sound product, accurately and economically produced.

Social Value of the Institute

I feel that in the Institute we have at our command a much wider scope of benefit than many members realise. In any community of people, or even life itself, one only gets out that which one is prepared to put in. The point I wish to make is, that whilst listening to Papers and taking part in discussions are some of the benefits of Institute membership, there is another aim of the Institute which I feel is often neglected, and that is, the social side—the getting to know one another personally and talking "shop" with someone who is in the same industry, but has other problems and other ways of overcoming them. On the basis that the spectator sees more of the game than the player, a problem discussed with someone outside it will frequently suggest a fresh line of approach. If

*The writer of this letter was the late Mr. James Ellis, later to be President of the British Foundrymen's Association.—EDITOR.

A Review of Progress

we can achieve this it will make the Institute such that no eligible foundryman can afford to be outside its membership.

With this in mind the Branch Council have organised a smoking concert and supper at the White Horse Hotel, where it is hoped the members will have an opportunity of getting to know one another. This is a new departure and it is hoped members will make a special effort to attend this meeting and so ensure its success.

Students' Section

With reference to the Branch Programme, it will be noticed that this year the Students' Section Programme has been included. The Students' Section is showing every sign of being a very healthy youngster and the source of satisfaction to its parents the Branch Council, who, it must be admitted, had a few misgivings about launching a Students' Section, for past history in Birmingham and other centres showed that they are apt to fade away. The success of the Birmingham Branch Students' Section is due to the fact that the members are running the Section themselves with their own chairman, secretary and committee, who are keen and enthusiastic and have the makings of very useful members for the senior branch—members who will gain experience in the running of a branch. The National President attended their first meeting of the session on September 8 and was impressed with the attendance, the high standard of the discussion and the businesslike way in which the meeting was conducted. This is another development in the facilities now available to the foundry industry for the distribution of knowledge. These young men will grow up in an atmosphere of mutual help. The sharing of knowledge on foundry matters will come naturally to them. They will, I hope, make friends which will last them a lifetime.

Foundry Training Centre

Finally, the latest contribution to the spreading of foundry craft is the opening of the Foundry Training Centre by the C.F.A. and the West Midlands Foundry Advisory Committee (Recruitment and Training) at the foundry of Rudge Littley, Limited, Swan Village, West Bromwich, for the practical training of foundry apprentices. This again is a new venture and, like so many other engineering developments, has started in Birmingham. It is hoped that other centres on similar lines will be opened throughout the country, and so ensure the continuance of a high standard of craftsmanship and skill in the foundry industry for many years to come.

House Organ

S. and W. Magazine for October. Published by Smith & Wellstood, Limited, Bonnybridge.

This issue announces the appointment of Mr. R. F. Maxwell, until recently London director, as Sales Director. It also contains a selection of excellent snapshots of the employees' children.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

CLEANING OF STEEL CASTINGS

To the Editor of THE FOUNDRY TRADE JOURNAL

SIR,—I would like to refer to the written contribution, submitted by Mr. H. J. Young, on page 320 in your issue of September 30, in connection with my Paper on "The Cleaning of Steel Castings," which you were kind enough to publish.

Mr. Young quotes from my remarks on page 313 regarding the humidity engendered in the fettling shop atmosphere being effective in laying a considerable amount of suspended dust. Perhaps in this paragraph I used the word "humidity" somewhat loosely. What I meant was that the "Scotch mist," arising from the spray coming from the Hydro-Blast gun, had the effect of laying dust. I have no reason to think that an excessive humidity, in the form of water vapour, would have any substantial effect in laying suspended dust.

With regard to Mr. Young's remarks on de-coring, it is not necessary to impregnate cores with water before Hydro-Blasting, since the Hydro-Blast jet traps the dust as it is created, and does not release any dust from the core into the fettling shop atmosphere. At the author's foundry, experiments have been undertaken in forcing water into the middle of big cores, on the lines suggested, to see whether the cores so treated would disintegrate more quickly on the application of the Hydro-Blast jet. It was found that such treatment did not appreciably affect the time taken to clean the castings.

In conclusion, I would like to thank Mr. Young for his interest.

Yours, etc.,
A. B. LLOYD,
Deputy Managing Director
F. H. Lloyd & Company, Limited,

Festival of Britain, 1951

Plans announced last week for the Festival of Britain disclosed that the London section will be held from May to September, 1951, on a site of 27 acres on the south bank of the Thames near Waterloo Station. At present, mainly through trade associations, a request is being made for manufacturers, designers, craftsmen, commercial and industrial artists, engineers, architects and inventors to send photographs or prototypes of current products of which they are most proud. This will at first form a "card-index" for home and overseas inquiries, and will later be used to suggest material for the actual Festival projects.

In general, the Festival is designed to illustrate to the world the British way of life and demonstrate both how we work and play. It will not be in any sense a trade fair though the usual trade-fair facilities may be extended in that year. In addition to the London section there will be complementary Festival exhibitions and displays at many cities and pleasure resorts throughout Great Britain.

A Successful Trading Organisation

Presidential Address to the Lincoln Section

Mr. A. Swain took this subject for his inaugural address as President of the Lincoln Section of the East Midlands Branch of the Institute of British Foundrymen. The following is taken from his statement.

A successful trading organisation obviously must have efficiency and to obtain efficiency there must also be the following:—(*a*) Highest possible productivity; (*b*) good working systems; (*c*) cost control; (*d*) good industrial relations; (*e*) correct use of personnel; and (*f*) co-operation.

A Commercial Undertaking

Whatever one may hear to the contrary, the foundry is first and last a commercial undertaking, and whatever the product manufactured, the end is precisely the same. It has to sell, and if the price be too high the result is easy to understand. Without the necessary output, whether nationally or individually, a foundry loses the power to sell its goods and the nation or individual with the higher productive efficiency will take its place. Again, the need for greater output at competitive costs was never more important than it is to-day. There is every indication that the sellers' market is rapidly disappearing and business will again be dependent on the quality of the product and its price. Competition is on its way and it is hoped that all foundrymen have been wise and have prepared for this phase, which is only just around the corner.

There is little personal fear but that founders will overcome their difficulties and again take their proper place in the world, but first there must be confidence between man and man. There must also be loyalty; this is a two-way affair, for no one can expect loyalty without giving a like return, and, when there is that complete co-operation and trust between men, our industry will achieve a much greater productivity per man-hour and be able to compete with any nation in the world.

Production and Capacity

Whatever the size of the foundry, whether it be one that can be personally operated by one man or a foundry with a large staff, the output per man-hour is all-important, but this cannot be obtained unless there is system. Output is not much good if the cost is not known or whether one is supplying one's customer with the particular items which suit his manufacturing programme, for the customer forecasts his schedules on the capacity of his works and the ability of outside suppliers to deliver by the dates indicated. There are many types of systems, both simple and otherwise, but a system is useless unless it provides control. Before deciding upon any type of control it is necessary to ascertain the extent of the information required, for it is possible to collect much more data than is actually needed. Also, all information collected requires manpower for collection, and this is expensive if the figures, etc., collected are of no practical use.

Production control is the ability to follow each particular order from receipt to delivery of the goods to the customer. It should also be able to give, before acceptance of the order, the actual date when the item would be delivered so that the customer can base his manufacturing schedule on the information given. Everybody in the foundry industry must realise that he is only a cog in the final product, and upon his efforts is built the great reputation this country has always enjoyed.

It is essential that all foundries, whatever the size, should know the capacity of the foundry in terms of labour and machine potential, for upon this assessment all delivery dates are based and the production load is known at any time. It is a great advantage for any management to know the actual forward programme of the works and it is also an urge to production if the operative knows the amount of work of his own particular kind that is planned ahead. By this method the old fear of "Is there another job for me" disappears and he is able to give his best with a contented mind.

It is always an advantage when starting production control to plan one section of the foundry only and gradually extend the planning and controlling to the whole works. This will give the personnel employed in running the scheme an opportunity of consolidating each section before passing to another. It is realised that the types of foundries vary very considerably and that the majority are of the smaller type, but it is just as important for the small foundry to know at once the position of any order and the loading of the foundry. A works of this type naturally has a large percentage of jobbing work and "one off's" and it is essential that with a small capital it must be turned over the maximum number of times per year if all expenses are to be met and a reasonable profit is to be made. It is possible for one man only to plan, fix rates and route all work in a small works, because a good planning system will eliminate all chasers and provide records that are available and give up-to-date information.

Time Basis for Planning and Loading

The basis of all planning and loading is time, all operations being brought to an hourly basis. This is comparatively easy when the works are on payment by results, as times known and estimated can be relied on and the capacity of any section can be calculated on these figures. If, however, the works are on plain day-work, this rating of the capacity of the works becomes a much more difficult problem, for ordinary day-work times cannot be used with any confidence as all in industry know that these times are never twice alike. It is recommended, therefore, that the first step

A Successful Trading Organisation

in a works on plain time work, if increased output is to be obtained, is the introduction of some system of payment by results. This will provide the necessary incentive to the man and also ensure the management will obtain times that are correct and can be used when quoting for repeat orders.

The average operative prefers the straight time or money value per piece as it is easy to calculate the money earned; it is most important that in any scheme of this nature the calculation should be made easy.

Present-day Conditions

In some directions in the last few years the importance of foundries has been realised and capital spent in bringing them up to date, but much more has yet to be done, for, without the foundry, the machine shops become partly redundant. It is not long ago that £5,000 to £10,000 would be paid for one machine tool to machine a casting, but the foundry would have to produce that casting with the old method and equipment of years ago because it was considered that machine shops must come first. This state of affairs is disappearing but not fast enough, for increased production per man-hour cannot be obtained with obsolete tools. In some foundries, tools now in use are over 50 years old and they are valueless in to-day's striving for output. They are the legacy of the old days when tools for the foundry did not matter, so to-day many firms are having, or will have, to spend considerable sums of money on equipment to bring up-to-date foundries that have been neglected in the past. Fabrication has made great headway in the last few years, and that fabrication in place of castings was forced on the engineer in many cases due to high cost of castings, *etc.*, and also the out-of-date methods in the foundry. To-day, with modern methods, it is doubtful if 10 per cent. of fabrication is cheaper than castings, only for a one-off job will fabricated items compare favourably with castings produced in a modern foundry. With the present shortage of steel, fabrication will grow less and the foundry world should take advantage and regain what has been lost. But this can only be carried out by modern methods and equipment and it is, of course, understood by all in the industry that, owing to the various types of works and the great variety of castings required, each works must study this problem individually, in relation to the result required and the money available.

Plea for Standards of Comparison

If a foundry is only dealing with one article in sufficient number, the problem is very much simpler than if the resultant products are very varied, of small numbers off and vary greatly in size. This illustrates the point in suggesting that founders should try and arrive at a common talking point, for whenever they meet the talk is the number of boxes per hour produced and this reveals just nothing. One hundred boxes in one works would not compare with 20 boxes per hour in another, for the 100 per hour might be on a plant that has been laid down for one particular item and the other on a plant that takes jobs as they come. Another point in this boxes per hour discussion should be the final figure that is quoted, the number of boxes produced per man in the system, both direct and all in. This would give a fairer comparison, but is still of no particular use for comparing with other foundries, for it is very rarely that the same article is manufactured with identical facilities. It is very difficult to arrive at a suggestion for the common talking point other than the final selling cost, but it is possible that at some future date this will be achieved. It is suggested, however, that as a start the output in lbs. per man-hour, both direct and all in, should be collected, as this is a very much better indication of the efficiency of a works than the number of boxes from machines. It is on the factory as a whole that the final costs must be collected and, of course, the selling price determined, for in the very near future this will be the main subject of conversation of the customer.

Study of Movement

Another great aid to production is one that has been very much neglected in foundries and that is the study of movement (both material and labour), for the handling of materials in a foundry is very much higher than in other branches of engineering. It is commonly accepted that for every ton of castings delivered from 90 to 150 tons has to be moved, and here is a large field for saving. A length of roller conveyor or the changing of a sand bin may provide extra time for direct workers. It is not suggested that the time is ripe for the compiling of foundry flow process charts, but much can be done daily by eliminating unnecessary movement. A case in point is brought to mind when a simple roller conveyor through a wall delivered material direct to a machine and saved many hours per day of laborious work, and there are many hours which can be saved in all works and used more gainfully by studying the movement of materials and the finished product. It is often stated that this could be more easily applied to medium and large foundries where there is some degree of mechanisation, but is it not also true that in lots of small jobbing foundries there is much scope for the elimination of unnecessary movement.

Importance of Costing

Efforts to increase output are of no avail if the total cost is not known, for a works relies on results, and these can only be obtained by a cost system of some sort. The methods of cost accountancy in foundries are numerous, some good, but some just guesses. Many can remember the 1930's when cut-throat prices were in operation and how firms lost money, principally because they did not know the cost of individual castings.

Recommendations for foundry costing have been issued by the Institute, these give the findings of a committee which sat in 1936, and recently there have been published the recommendations of the Costing Committee of the Council of Ironfoundry Associations. Both these reports are very comprehensive and are the basis of a uniform costing system for foundries. It is understood that small firms cannot employ a cost

accountant full time, but is it not possible for a group of small foundries to employ a works accountant to superintend the costing of their works. This subject of costs is very important and will become more so, and every effort should be made to obtain correct figures, for only on these can one hope to exist.

The old method of bulk quotation at a cost per cwt. is successful when the contract is evenly balanced, but after the first order the repeat single item may be a class of casting which it is impossible to produce at the agreed price, but with a good costing system it is always possible to give individual costs for each item produced. The management then know that whatever order is received it will stand on its own and not be paid for by something else. Also, another objective of a cost system is to bring to the attention of the management the existence of inefficiencies, so that steps can be taken to eliminate them.

Problems of Labour Supply

The shortage of skilled labour in the foundry industry is well known, and many different methods are operating to attract men into the works, one, of course, is the Garrett Report, which sets out the standard of amenities for all foundries. Most managements are carrying out these recommendations, but it must be realised that the fullest co-operation of all employees with the management is essential to make the schemes a success. One-way traffic is useless. Another point which should be given much thought is the converting of the schoolmasters by making them foundry minded, for it is to a large extent in their hands that we rely on the future management of the industry. In the U.S.A., a great advertising campaign is in being to popularise the industry, with the slogan of "The Foundry is a good place to work." This should also be the motto here, and all should do their best to let the world know the benefits and opportunities that are to be had in the foundry. Foundries must also overhaul their methods and use all skilled labour to the best advantage; all labouring work carried out by the craftsman must be eliminated, and skill only used where skill is needed.

THE INDEX TO VOLUME 84 of the JOURNAL, January to June, 1948, is now available, and may be obtained by writing to 49, Wellington Street, London, W.C.2.

Kulti by the Indian Iron & Steel Company, Limited. but has not been put into full operation yet due to shortage of transport to move coal and ore. It is understood that everything will now be done to get this blast furnace put into full operation. The value of plant and machinery which has arrived for the foundries, but has not been installed, is negligible; estimate of additional plant and machinery likely to arrive in the next three years for modernising the foundries is about £770,000.

The final paragraphs deal with the difficulties of transport to supply the blast furnaces at Kulti.

Industrial Development in India

The United Kingdom Senior Trade Commissioner at Delhi has reported that the Government of India has announced a three-year plan for the development of certain industries. This development is to be achieved partly by direct State participation in industry and partly by encouraging and assisting private enterprise. The following report is based on preliminary information tabled in the Assembly by the Minister for Industry and Supply on April 1, 1948, in reply to a Parliamentary question.

The main factors dictating the scope and pace of development will be:—(*a*) The availability of certain scarce materials and stores; (*b*) the extent to which relations between labour and management improve; (*c*) the extent to which private enterprise is prepared to undertake new commitments, which will depend on the extent to which the confidence of the investing public in India is restored; (*d*) the extent to which the transport situation improves; (*e*) the rate at which the hydro-electric projects materialise, and (*f*) the extent to which technicians and trained workers can be made available.

It is thought that the following report will be of interest to United Kingdom manufacturers in that it will help them (*a*) to identify India's industrial objectives, and (*b*) give them an indication of the implications of the industrial programme in terms of demand for raw materials, capital plant, machines and tools from external sources. The report only gives a general outline and it is hoped to supplement the information from time to time as further information is secured.

Short-Term Development for Foundry Industry

The following is the plan for the short-term development of the Indian iron castings industry: This industry is the backbone of the machine-tool industry and of industrial machinery and also supplies essential needs such as cast-iron pipes and cooking pans. At the moment there are 1,292 ironfoundries in India and the annual total capacity is 557,600 tons. By the end of 1950 it is hoped to decrease the number of foundries to 560 and augment production to 1,200,000 tons. Amongst the existing foundries, only about 40 of them manufacture 2,000 tons of castings or more each per annum. The rest of the foundries are all small ones. Out of 40 large foundries, only about a dozen or so could be termed really efficient units. The quality of the castings produced by the rest is poor. Therefore, if the industry is to be rationalised, it will be necessary to shut down more inefficient units, but there will be difficulties in doing so. However, in order that the foundry may be run on economical lines, its output of castings should be at least 2,000 tons per annum. If the plan of rationalisation can at all be adopted, it is estimated that 24,000 tons of coal can be saved on an output of 50,000 tons of castings.

The chief raw material needed for the foundries is pig-iron. A new blast furnace* has been erected at

(*Concluded at foot of Col.* 1.)

*The new blast furnace at Kulti, mentioned in the report, probably refers to the blowing-in of an existing furnace either at Kulti or at the Indian Iron and Steel Company's Hirapur Works; no new furnace has been installed at Kulti since 1935.—EDITOR.

Notes from the Branches

London Branch—East Anglian Section

The Autumn Session of the East Anglian Section of the London Branch opened with a meeting at the Lecture Hall of the Central Library, Ipswich, last month. Mr. L. W. Sanders, having been inducted into the chair, delivered the following inaugural address:—

It is gratifying to assume the chairmanship of this section when the membership is larger than ever before. We are, at the moment, some 90 strong, which is approximately one-seventh of the total Branch membership, and when you consider that the London Branch covers an area bounded on the east by the North Sea and on the west by a line extending from the Wash to the Isle of Wight, we are indeed a healthy baby of a big parent.

The increase in membership of this section does at least reflect the interest shown in the work of the Institute by the foundrymen of East Anglia. I have no doubt that before the session ends we shall have attained our century of members and, with ever-increasing membership, gain, in the foreseeable future, full Branch status for ourselves.

Practical Ends for Research

We are perhaps fortunate in this section to be predominantly practical foundrymen who, after all, comprise that section of the personnel of the industry which provides the "know-how," and in times such as these, when labour is at a premium, materials in short supply, and entry into the industry of apprentices and young men at a minimum, the "know-how" is all important, if the quality of cast products is to be improved.

Under the auspices of the Institute and acting from the Technical Council, many committees are set up to operate and deal with technical problems that arise. Also, many other and widely diverse organisations deal with foundry practice and technology. Generally speaking, these committees aspire to academic research, or conversely, spend valuable time in searching for alternatives, or substitutes for existing materials rather than getting down to work of first importance to the founder, such as gating and feeding, shrinkage and porosity, and the elimination of defects common to most metals.

Competition is already coming from the other industries, and components that before the war were the prerogative of the ferrous foundry industry, are now being made at high production speeds in die-cast aluminium, plastics and other materials. That these industries will continue to improve and expand their products there is no doubt. Therefore, it behoves the sand-cast metal industries also to improve their products, and this will only be done by constant research of a practical nature, the adoption of new production methods, and by maintaining and improving present quality.

In times of high output it is very easy for quality to be sacrificed to production and the idea might be gained that anything that looks like a casting is good enough; but this can, of course, have repercussions on the good foundrymen as well as the bad, by causing engineers and designers to lose confidence in sand-cast products. It cannot be too strongly emphasised that to-day's concession is to-morrow's standard. Therefore, quality tends to deteriorate rather than improve.

Quality Control

Quality is defined as something being excellent, or superior. This general definition may be interpreted in foundry language as excellence of casting finish and superiority in the mechanical condition. In other words, something of which the craftsman, technician and management may be proud. Whether the excellence of casting finish is obtained by this sand or that, or the superiority in the mechanical condition by this pig-iron or that, is of little importance to individual founders, but excellence and superiority is the goal to which we should all aim.

Soundness is, of course, one of the most pressing problems, as much productive time can be lost by machinists when castings are scrapped by reason of internal defects. Perhaps the day may come when foundries can guarantee their casting in every respect, and if this can be attained, it will be by the industry within itself getting down to the problem rather than by the multiplicity of committees which deal with foundry practice.

The position, as it can be seen at the moment, is that progress and pride in one's product comes from a few visionary individuals who deal ruthlessly with the preconceived and traditional ideas in the art of metal founding, rather than from the bigger research organisations dealing with problems of a very academic nature. One well-known international organisation does attempt to control the metal aspect of foundry practice, and more recently a new body called the Technically Controlled Castings Group has been formed from within the industry.

The objective of this organisation is to promote and establish by control a high standard of efficiency in the production of castings; to collect, collate and exchange technical information which will assist in improving the quality of castings; and to institute such controls and inspection to reduce defective castings to a minimum. To attain these objectives this group comprises all grades of technical and practical personnel, freely interchanging ideas and modifications to existing techniques and generally driving towards the ultimate millennium of the guaranteed casting. If the industry is to continue to flourish it will need constant enlightened supervision from management, technicians. and, more important still, from the craftsman himself.

The address was followed by a Paper by Mr. G. L. Harbach on the "Development of Foundry Sand Control," Mr. D. Carrick expressing the thanks of the meeting to the lecturer.

MR. C. CARTWRIGHT has been elected chairman of the Transvaal Foundry Association—an employers' federation.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained.

Blackpool, November 8—Supply of 45 advance direction signs, for the Borough Council. The Borough Surveyor, Municipal Buildings, Blackpool. (Fee £2 2s., returnable.)

Cradley Heath, November 5—Provision and laying of about 1,760 yds. of 9-in. to 21-in. dia. cast-iron and concrete pipe sewers, etc., for the Upper Stour Valley Main Sewerage Board. Mr. G. P. Deeley, engineer, 13, Church Street, Stourbridge. (Deposit £5 5s.)

Deben, November 9—Contract No. 2:—Supply of valves and fittings for spun-iron water mains, for the Rural District Council. Pick, Everard, Keay & Gimson, engineers, 6, Millstone Lane, Leicester. (Fee £2 2s., returnable.)

Mere and Tisbury, November 4—Construction of a service reservoir and supplying and laying of approx. 100 yds. of 8-in. spun-iron pipe, etc., for the Rural District Council. Mr. T. W. Whitfield, Hilperton, Trowbridge, Wilts. (Fee £2 2s., returnable.)

Merthyr Tydfil, November 1—Provision and laying of about 1,850 yds. of 8-in. dia. iron pipe water mains, etc., for the Borough Council. The Borough and Waterworks Engineer, Town Hall, Merthyr Tydfil. (Fee £3 3s., returnable.)

Neyland, November 8—Construction of 12-in. and 9-in. stoneware and cast-iron sewers and manholes, sedimentation tanks, sludge pumping station, and 10-in. cast-iron sea outfall, etc., for the Urban District Council. A. P. I. Cotterell & Son, engineers, 54, Victoria Street, Westminster, London, S.W.1. (Deposit £3 3s.)

Thorne, November 13—Construction of about 800 yds. of 12-in. spun-iron pumping main, for the Rural District Council. W. H. Radford & Son, consulting engineers, Albion Chambers, King Street, Nottingham. (Fee £2 2s., returnable.)

British Wrought Iron Association

Delegates from Lancashire, Staffordshire, Yorkshire, and the North-East Coast, as well as Scottish members, attended the annual conference of the British Wrought Iron Association at North Berwick. Mr. Hugh C. Waterston, vice-chairman of Bairds & Scottish Steel, Limited, who has been chairman of the Association since 1938, received a presentation from members as a token of appreciation of his services during a difficult period. The presentation was made by Mr. H. W. G. Ferguson, vice-chairman and a director of Raine & Company, Limited, Newcastle-upon-Tyne. Mr. Waterston was re-elected chairman.

BROWN & COMPANY, ironfounders, of Chamberlain Street, Belfast, has removed to new premises in Sydney Street West. The firm was founded in 1885 as Brown Bros. by the late Mr. William and Mr. Robert Brown and is still a family concern under the control of Mr. R. S. Brown, grandson of one of the founders.

September Steel Output only just Short of Record

Success of Home Scrap Campaign

Steel production in September—the first full month following the holiday period—was at an annual rate of 15,435,000 tons, or only just short of the all-time record of 15,444,000 tons set up last June. Last month's output compares with a rate of 14,117,000 tons in August and 13,841,000 tons in September, 1947.

The British Iron and Steel Federation states that steelmakers have been able to maintain a high level of production largely because of the success of the home scrap campaign inaugurated by the B.I.S.F., the Joint Iron Council and the Scrap Merchants' Federation in October of last year. The campaign has yielded an increase of nearly a million tons of iron and steel scrap. A further appeal is now being launched, and all holders of industrial scrap are being urged to speed the turn-round of scrap, while a campaign directed at the farmers is now under way.

Pig-iron production in September was at an annual rate of 9,407,000 tons, against 9,048,000 tons in the previous month and 7,805,000 tons a year ago.

Latest output figures compare as follow with earlier returns:—

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
	Tons.	Tons.	Tons.	Tons.
1948—1st half ..	178,300	9,274,000	291,000	15,129,000
July	171,300	8,908,000	232,400	12,084,000
August ..	174,000	9,048,000	271,500	14,117,000
September ..	180,900	9,407,000	296,800	15,435,000
1947—1st half ..	138,000	7,176,000	230,100	11,963,000
July	143,500	7,460,000	211,700	11,008,000
August ..	147,200	7,657,000	234,200	12,179,000
September ..	150,100	7,805,000	266,200	13,841,000

Prices of Raw and Fabricated Aluminium Products Raised

The British Aluminium Company, Limited, announces that, in view of the increased prices for virgin aluminium, announced by the Ministry of Supply, which came into effect on October 1, the company's prices for raw and fabricated aluminium products have had to be adjusted. The new raw material prices reflect the increases in the price of aluminium and other metals used for alloying. The new prices for fabricated products have also taken partially into account the effect of recent wage awards, the overall result being, in general, an increase of 1d. per lb.

The new prices apply to all orders accepted on or after October 11 and to any despatches against earlier orders on or after October 15 in the case of raw materials, and December 1 in the case of fabricated products.

Obituary

MR. GEORGE SCOTT, ironfounder, of Denny, Scotland, died on October 8.

MR. HENRY MURRAY, managing director of Brownlie & Murray, Limited, structural engineers, of Glasgow, died in London recently.

MR. JAMES SIMMONS, for over 40 years with G. & J. Weir, Limited, engineers and founders, of Glasgow, died suddenly on October 9.

MR. WILLIAM LEES, a director of William Lees & Sons, Limited, engineers' merchants and agents, of Glasgow, died on October 10.

MR. HARRY VARLEY, formerly for some years organising secretary of the Chesterfield branch of the National Union of Foundryworkers, has died at the age of 66.

MR. JOHN CARSWELL, proprietor of Robert Ferlie & Sons, ironfounders, of Auchtermuchty, Fife, died recently. Mr. Carswell took over the business 15 years ago after having been manager for 30 years. He was 69.

MR. HORACE FEATONBY, former general manager of the Warrenby Works of Dorman, Long & Company, Limited, has died at Montreux, Switzerland, where he was spending a holiday for health reasons. He had been 40 years in the service of the company, during which time he toured American steel plants and for a period represented the firm in South Africa. He was appointed assistant works manager at Warrenby in 1936, took over the post of general manager a year later and retired in 1943.

MR. STANLEY MILLER THOMPSON, who died on October 6 at the age of 67, had been well known in shipping circles for many years. He came of a family of shipbuilders in Sunderland, but left the family business in 1904 to become a shipbroker and manager in London. He was founder and former chairman of the Silver Line, Limited. Owing to ill-health, Mr. Thompson relinquished the chairmanship of the company last March, while he resigned his directorship in June. He retained other appointments, however, including directorships of Joseph L. Thompson & Sons, Limited, shipbuilders and repairers, of Sunderland, and its subsidiary company, John Crown & Sons, Limited, Sunderland.

SIR PETER BOSWELL BROWN, former chairman and managing director of Hadfields, Limited, Sheffield, died on October 12 at the age of 82. Sir Peter became general manager of the company in 1914, was appointed joint managing director three years later, and in 1930 deputy chairman. He was closely associated with the development of manganese and other alloy steels with Sir Robert Hadfield, whom he succeeded as chairman and managing director. When he retired, in 1945, he had spent 57 years in the service of the firm. Sir Peter was also a former Master Cutler and president of Sheffield Chamber of Commerce and was an hon. vice-president of the Iron and Steel Institute and the British Iron and Steel Federation. He was knighted in 1945.

Iron-ore Production in the North Midlands

84 *Per Cent. of Total Consumption*

The North Midlands is now producing 210,000 tons of iron ore per week, representing 84 per cent. of the total home consumption, states Mr. R. Henderson-Tate, Regional Controller, Ministry of Supply, in a report to the Regional Board for Industry. The report reveals that the value of approved modernisation and expansion schemes already in hand at the works in the region amounts to £18,000,000, this being the first instalment of further anticipated schemes.

The report also states that, with one exception, the whole of the spun-iron pipe production in the country is carried out at three firms in this region—apart from the seamless and welded-tube production at Corby, Northants. Mr. Henderson-Tate lays particular stress on the importance of the supply of scrap at the present time. Generally speaking, he says, the iron and steel distribution scheme, which came into effect in April, is working satisfactorily and has assured a fairer distribution throughout the engineering industry.

Practical Training for Structural Engineers

On his installation as chairman of the Northern Counties branch of the Institution of Structural Engineers, at Middlesbrough, Mr. Pullan Mitchell, manager of the bridge and constructional works of Dorman, Long & Company, Limited, urged the need of more practical training for young structural engineers. Too often, after a good theoretical training in college, they settled down to work in offices making drawings and calculations, but he questioned whether they could become really qualified engineers unless they accepted every opportunity to get practical training. He urged the Northern Counties branch to take the lead in imparting practical knowledge.

The retiring chairman, Prof. W. Fisher Cassie, head of the structural engineering department of King's College, Newcastle-upon-Tyne, said that the branch had had a notable first year and it had not been weakened by splitting it into two sections—Tyne and Tees.

German Scrap for Britain

The Joint Export Import Agency announced in Frankfurt last week that bizonia will release enough scrap metal by January 1, 1949, to supply the United Kingdom and the United States with a total of 500,000 tons each. Under the new distribution procedure, approximately 225,000 tons will be released to other E.R.P. countries over the same period.

The price for a long ton of "number one" melting scrap, delivered at the German border, has been set at $28.50, while a long ton of cupola cast-iron scrap will cost $52.50.

Personal

MR. W. E. STANLEY has been appointed a director of Darwins, Limited, steel manufacturers, of Sheffield.

COL. KENNETH CANTLIE has been appointed overseas representative of the Locomotive Manufacturers' Association.

MR. FRED PARMENTER has retired from the board of the British Thermostat Company, Limited, Sunbury-on-Thames, Middx.

MR. WILLIAM WOOD, secretary of Seagers, Limited, engineers and founders, of Dartford, Kent, has retired after 65 years' service with the company.

MR. L. MELLOR, of A. Reyrolle & Company, Limited, Hebburn, is the new chairman of the North-East Centre of the Institution of Electrical Engineers.

MR. H. B. T. WILDE has been appointed deputy chairman and MR. R. S. BLACKLEDGE has been elected a director of Veritys, Limited, manufacturing electrical engineers, of Birmingham.

MR. K. B. ROBINSON, formerly of the staff of the English Electric Company, Limited, has been appointed efficiency and testing engineer to the Yorkshire Division of the British Electricity Authority.

MR. J. HANSON has retired from the position of assistant commercial manager of Dorman, Long & Company, Limited, Middlesbrough, after 54 years' service with the company and its associates.

MR. HARRY SIMPSON, of Short Bros., Limited, shipbuilders, of Sunderland, has received a presentation to mark his 50 years' service with the company, during which he has assisted in the fitting-out of 200 vessels.

MR. T. H. Y. BONSEY, of the British Aluminium Company, Limited, has been appointed sales manager of the Aluminium Wire & Cable Company, Limited, of Swansea and London. Mr. C. H. E. RIDPATH, also of the British Aluminium Company, has joined the new company as deputy sales manager.

MR. H. TILSLEY has been appointed assistant sales manager (export) of the British Aluminium Company, Limited. It is also announced that MR. W. H. MARSTON is relinquishing his position as manager of the Leeds branch office, at his own request, and will be transferred to the London branch office as from November 1. MR. A. E. HEELEY becomes manager at Leeds.

MR. NATHANIEL C. FICK, a metallurgist for the Battelle Memorial Institute for the last five years, has been appointed deputy executive director of the Committee on Basic Physical Sciences of the Research and Development Board in Washington. He is a member of the American Institute of Mining and Metallurgical Engineers, the American Society for Metals, the American Association for Advancement of Science and the [British] Iron and Steel Institute.

MR. C. PARRY, MR. D. F. WALTON, MR. W. HALL and MR. H. H. MUMBY have been appointed local directors of Thos. W. Ward, Limited, Sheffield. Mr. Parry and Mr. Mumby have for many years been closely connected with the company's shipbreaking activities, and Mr. Hall with scrap iron and steel. Mr. D. F. Walton, son of Mr. J. Walton, assistant managing director of the company, is connected with the company's activities as railway siding consultants and contractors. He is also a director of the Darlington Railway Plant & Foundry Company, Limited, an associated company.

SIR STEPHEN PIGOTT, after 40 years' service, is resigning from his position as managing director of John Brown & Company, Limited, shipbuilders, of Clydebank, on October 31, due to ill-health. His successor will be DR. JAMES M. M'NEILL, deputy managing director. Sir Stephen, who will remain a director of the company, joined the staff of John Brown & Company in 1908, and subsequently became manager of the engine works at Clydebank, local director of the company, and finally a member of the main board. He was awarded the gold medal of the American Society of Mechanical Engineers in 1935 and the Charles Algernon Parsons medal in 1940. He was knighted in 1939.

Wills

WHYTE, MATTHEW, founder of Matthew Whyte & Sons, engineers and machinery merchants, of Glasgow £10,176

REES, W. J., late chairman and managing director of the Glanmor Foundry Company, Limited, Llanelly, chairman of Metamine (England), Limited, a director of the Glanmorfa Foundry & Engineering Company, Limited, Llanelly ... £59,004

BREARLEY, HARRY, the discoverer of stainless steel, a late director of Brown Bayley's Steel Works, Limited, Sheffield, and Farnley Iron Company (Fireclay Works), Limited, and for many years head of the research laboratory of Thos. Firth & John Brown, Limited, Sheffield £80,881

Sheepbridge Engineering, Ltd.

Sheepbridge Engineering, Limited, has been formed to acquire from the Sheepbridge Company, Limited, the assets of the business of general engineers and interests in Sheepbridge Stokes Centrifugal Castings Company, Automotive Engineering Company, the Light Production Company, Yorkshire Amalgamated Collieries, Doncaster Amalgamated Collieries, and the Newstead Colliery Company. The powers of the new company cover the business of general mechanical, motor and electrical engineers, iron and brass founders, boilermakers, iron and steel cable makers, etc.

The capital of Sheepbridge Engineering, Limited, is £777,330 in 10s. shares, 167,365 shares being 5 per cent. cumulative participating and 1,387,295 ordinary. The directors are:—Lord Aberconway, Mr. Guy Nicholson, Mr. G. Jackson, Mr. T. E. Haslam, Mr. L. C. Hodges, Lt.-Col. John Leslie, Mr. A. V. Nicolle, Mr. Neil M. Peech, and Mr. F. W. Stokes.

G.K.B. Steel Production Records.

The melting shop at the East Moors Works, Cardiff, of Guest Keen Baldwins Iron & Steel Company, Limited, returned a record weekly production recently of 14,109 tons. The previous record of 13,266 tons was made during the week ended January 3, 1948.

During the week the previous production record for the fixed 100-ton furnaces was also broken, "D" furnace producing 2,047 tons, as compared with the previous record of 2,001 tons made during the week ended December 21, 1946.

News in Brief

TEES IMPORTS of iron and steel scrap from Germany last month totalled 10,100 tons.

BRITISH IRON & STEEL CORPORATION, LIMITED, has bought the Isle of Man Steam Packet Company's cross-Channel steamer Mona's Isle for breaking up.

LITHGOWS, LIMITED, Port Glasgow, is to build a tanker of 13,500 tons dw. for C. Stamer, Bergen. The company has six more tankers in hand for Norway.

JOHN READHEAD & SONS, LIMITED, South Shields, has received an order for a cargo steamer of 10,000 tons dw. for Frank C. Strick & Company, Limited, London.

WALLSEND TOWN COUNCIL has approved plans for the reconstruction of factory buildings in the town for the Cookson Lead & Antimony Company, Limited, Newcastle-upon-Tyne.

A NEW MOTOR-RADIATOR repair and sheet-metal works has been opened in Bramall Lane, Sheffield, by F. E. Hall & Company, Limited, a firm which started two years ago in a temporary wartime factory.

WITH AN OUTPUT of 5,100 tons, the plate mills at the West Hartlepool works of the South Durham Steel & Iron Company, Limited, have beaten by nearly 100 tons their previous weekly record achieved a fortnight earlier.

GEORGE COHEN, SONS & COMPANY, LIMITED, has announced that the company's proposed new issue to preference and ordinary shareholders of 500,000 4½ per cent. cumulative preference £1 shares will be made at around 22s. 6d. a share. Consent of the C.I.C. is awaited.

CLAIMED TO BE one of the biggest machines of its kind, a 438-ton gyratory crusher, capable of crushing 1,000 tons of lime per hour, was unloaded at Manchester Docks on October 6. The unloading took practically a whole day, and a 250-ton floating crane had to be brought into use.

DORMAN, LONG & COMPANY, LIMITED, Middlesbrough, has submitted plans for industrial development in the Redcar area, including a rolling mill, stripper bay, steel plants, scrap gantry and other plant, to Redcar Corporation. The low-lying land included in the site is to be reclaimed by tipping ballast and slag.

EIGHT VESSELS of just over 15,000 tons gross were launched from Scottish shipbuilding yards during September, making the output for the nine months of this year a total of 84 vessels of more than 280,000 tons gross. This is a decrease of 6,000 tons, compared with the figure for the corresponding period of 1947.

DOBSON & BARLOW, LIMITED, Bolton, has secured a contract to the value of £250,000, for the supply of "Nelson" continuous spinning plant (including a large part of preparation machinery), from the Polish Purchasing Mission in London. This will be the first installation of British rayon spinning machinery in Poland.

THE HARBOROUGH CONSTRUCTION COMPANY, LIMITED, Market Harborough, manufacturers of foundry supplies, has appointed Barcon, Limited, Rutherglen, Glasgow, as representatives in Eastern Scotland and the Falkirk area. Mr. Gordon MacFarlane, of Barcon, Limited, will personally supervise this side of the business.

MR. JAMES CALLAGHAN, Parliamentary Secretary to the Ministry of Transport, revealed during his recent tour of North-East Coast ports that approval had been given by the Ministry for the rebuilding of a shed and the provision of four electric portal cranes and new crane track at Newcastle Quay, as had been recommended by the Working Party.

THE ANNUAL MEETING of Stothert & Pitt, Limited, engineers and ironfounders, etc., of Bath, will be held next Thursday, when a resolution will be moved for the reappointment as a director of Mr. E. S. Franklin, now 76 years of age. Mr. Franklin has served the company as a director for over 35 years, and the directors are in favour of his reappointment.

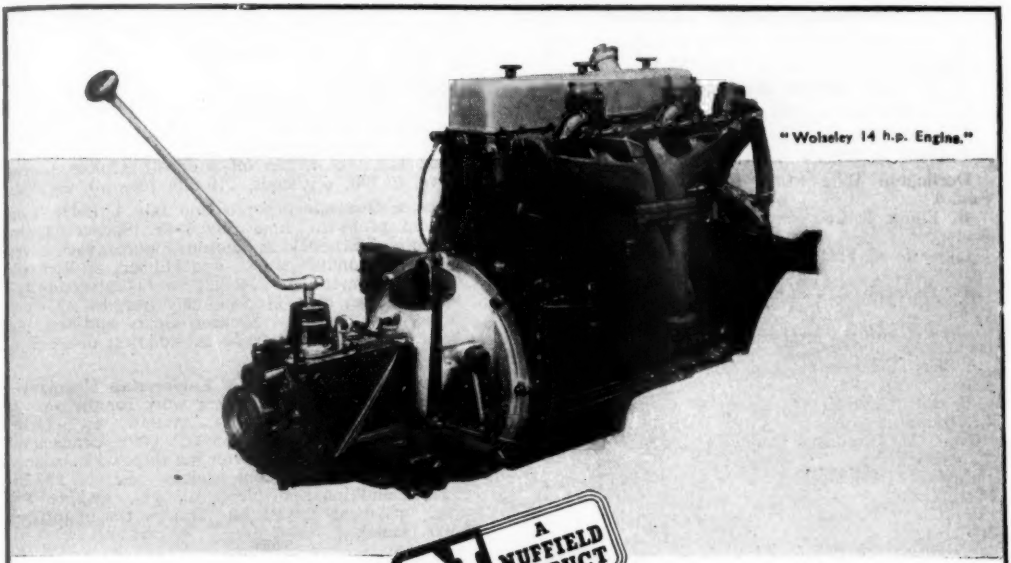
HERBERT MORRIS, LIMITED, manufacturers of cranes, conveyors, etc., of Loughborough, announces that its annual meeting will be held early in December on a date to be announced later. The meeting has had to be delayed to allow extra time for the compilation of group accounts required by the new Companies Act. In the meantime, the directors state that, in their view, the results of the year's trading are satisfactory.

WILLIAM DOXFORD & SONS, LIMITED, engineers and shipbuilders, of Sunderland, is to erect new offices covering 14,000 sq. ft. and costing £30,000 which will be used for experiments and research work with the Doxford oil engine. An application by the company for the stopping up of a back street near its shipyard at Pallion has been granted by Sunderland magistrates. The street is part of land needed for the construction of the firm's new research offices.

EMPIRE PARLIAMENTARY ASSOCIATION delegates, who visited the works of Bruce Peebles & Company, Limited, Edinburgh, recently, were shown machinery for Scotland's hydro-electric schemes, mining machinery and electric transformers for the national grid and for export. Other delegates visited Brown Bros. & Company, Limited, engineers, of Edinburgh, and Henry Robb, Limited, shipbuilders, of Leith. The visits were arranged by Edinburgh Chamber of Commerce.

THE GREAT WEST ROAD (Brentford) factory of Air Ducts, Limited (a subsidiary of Richard Crittall & Company, Limited), will be auctioned on November 24. This is the first step in the realisation of the property and assets of Richard Crittall & Company. The auctioneers are prepared to receive bids for the factory, which covers a floor area of 75,000 sq. ft., as it stands or for the factory shell. In the latter case the plant and equipment will be sold later in lots.

THE FIRST all-industry textile exhibition to be held in the United States since the war will take place in the Atlantic City Auditorium, Atlantic City, N.J., from May 8 to May 12, 1950, under the auspices of the National Association of Textile Machinery Manufacturers. It will be known as the American Textile Machinery Exhibition. Exhibits from British manufacturers will be welcomed and intending exhibitors should communicate with Mr. Albert C. Rau, vice-president of Campbell-Fairbanks Expositions Inc., of 929, Park Square Buildings, Boston, Mass.



Using

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Company News

(Figures for previous year in brackets.)

Eastwoods—Dividend of 8% (5%).

A. H. Hunt—Interim dividend of 7½%.

Chadburns (Liverpool)—Dividend of 3% (nil).

Hayden-Nilos—Interim dividend of 35% (32.5%).

Babcock & Wilcox—Interim dividend of 5% (same).

Darlington Wire Mills—Interim dividend of 10% (same).

B. Elliott & Company—Interim dividend of 33⅓% (same).

Lightalloys—Final dividend of 10%, making 15% (same).

W. G. Frith & Company—Interim dividend of 5% (same).

Lake & Elliot—Final dividend of 15%, making 20% (same).

Villiers Engineering Company—Dividend of 15% (same).

Bristol Aeroplane Company—Interim dividend of 4% (same).

James H. Lamont & Company—Interim dividend of 5% (same).

Baldwins (Holdings)—Final dividend of 11%, making 16% (same).

Southhook Potteries—Final dividend of 15%, making 20% (same).

Aerialite—Final dividend of 87½% (100%), making 150% (same).

William Beardmore & Company—Interim dividend of 4% (same).

T. M. Birkett & Sons—Final dividend of 22½% (25%), making 30% (same).

Watford Electric & Manufacturing Company—Interim dividend of 5% (same).

Marconi International Marine Communication Company—Interim dividend of 2½% (same).

A. Kershaw & Sons—Dividend of 12½% on the non-cumulative preference shares (same).

George Kent—Net profit for the year ended March 31, £51,520; dividend of 10% (same); forward, £54,194 (£24,635).

Leeds Fireclay Company—Final dividend of 5% (4%) on the preferred ordinary shares, making 8% (same); dividend of 6% (same) on the ordinary shares.

Colvilles—Interim dividend of 3% (same) out of current profits and a special interim dividend of 5% (same) out of the over-provision of taxation for the period 1939-45.

R. & W. Hawthorn, Leslie & Company—Final dividend of 5% and bonus of 10%, making 20% (same). In addition a bonus of 1%, tax free, was paid in March last from interest on tax reserve certificates.

Hughes-Johnson Stampings—Trading profit for the year ended August 3, after charging profits tax, income tax, depreciation, etc., £21,876 (£14,364); to deferred repairs, £20,000 (nil); final dividend of 12½% (7½%), making 20% (15%); forward, £44,517 (£56,940).

Holophane—Net profit for the year to June 30, £43,264 (£34,003); after providing £20,000 (£22,677) for tax and writing off £913 (£571) from goodwill and patents, there remains £22,351 (£11,326); final dividend of 7½%, making 15% (same); forward, £37,598 (£23,498).

Farrow & Jackson & Purdy—Consolidated trading profit for seven months to December 31, 1947, £57,810; plus fees, £8; to directors' fees, £479; directors' emoluments, £4,525; depreciation, £1,874; leaving £50,940; to tax, £27,200; written off goodwill, £2,000; general reserve, £7,500; dividends, £10,450; forward, £3,790.

Spencer Gears (incorporated on July 4, 1947)—Consolidated profit to June 30, 1948 (Spencer Gears, Limited, and Schofield & Samson, Limited, each covering an 18 months' period, and Hibbert & Richards, Limited, 15 months), £34,327; to taxation, £14,117; capital reserve, etc., £13,989; this includes the pre-incorporation profit of Spencer Gears and the pre-acquisition profits of the two subsidiaries; dividend of 25%.

Humber Graving Dock & Engineering Company—Profit on ship repair and other work for the year to June 30, £121,815 (£72,837); interest, etc., £1,165 (£1,054); to taxation, £43,065 (£28,000); depreciation of fixed assets, £8,250 (£6,716); net disposable balance, £47,161 (£18,814); to contingencies reserve, £37,261 (£8,914); additional dividend of 4%, making 8% (same); payment to British Transport Commission, £3,300 (same).

Metal Traders—Consolidated trading profit for the year ended March 31, £288,020; directors' fees, £1,868; other emoluments, £34,999; auditors' fees, £1,406; depreciation, £9,413; taxation, £133,649; income from investments, £1,183; surplus on realisation of assets, £1,583; provisions no longer required, £300; net profit, £109,751; interest of outside shareholders in subsidiary companies, £5,517; first and final dividend of 250% (same in two dividends); forward, £169,504.

Furness, Withy & Company—Consolidated profit on vessels' trading to April 30, after depreciation and deferred repairs, £2,300,863; gross dividends on trade investments, £217,543; on other investments, £328,236; to interest on debentures of a subsidiary, £10,208; auditors' remuneration, £9,504; income tax, £1,144,173; profits tax, £463,878; Dominion, Colonial and foreign tax, £88,334; leaving, £1,696,385; less proportion to minority holders' interest, £132,288; retained by subsidiaries, £501,203; parent company's balance, £497,054; to insurance reserve, £150,000; preference dividends, £41,250; ordinary dividend of 8%, £264,000; forward, £244,525.

Consett Iron Development

Mr. C. Cookson, chairman of the Consett Iron Company, Limited, has announced that the company is going ahead straightaway with the installation of a new combined slabbing and blooming mill to concentrate the whole of the primary rolling operations in one large thoroughly modern high-capacity mill which the Iron and Steel Board approved before its dissolution.

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SANDS. Wide range of Silica, and Moulding Sands.

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Raw Material Markets

Iron and Steel

Deliveries of foundry coke are being maintained and the allocations for the summer period, terminating at the end of this month, will in the main be implemented. Other requisites, including ganister, limestone and ferro-alloys for the engineering foundries, are coming forward readily. Foundries of all types have plenty of orders on hand for essential home industries as well as for export, but they are in arrear with deliveries due to stringency in the supply of pig-iron, the present production of which is far below requirements. Light foundries, for which high-phosphorus pig-iron is essential, are seriously handicapped in their programmes and in many cases are not working to capacity as they cannot obtain their licensed tonnages of this iron. A steady flow of low- and medium-phosphorus pig-iron is being maintained to the general engineering, jobbing and speciality foundries and, with supplies of hematite coming through fairly satisfactorily, apart from the higher silicon grades, their position is not so acute. In addition, supplies to most of these foundries can be augmented with refined pig-iron, deliveries of which are obtainable fairly easily. In the Midland area, suitable cupola scrap in cast iron and steel remains in short supply.

Re-rollers are still demanding more liberal supplies of all descriptions of steel semis, and defectives, crops, etc., command a ready sale. Nevertheless, the position is a little easier. British works have recently been delivering good supplies of heavy blooms and slabs, and among consignments from Belgium and Luxemburg, which over the next few months are to be increased by 100,000 tons, there has been received a fair proportion of small billets which should help to reduce the difficulties of the re-rollers of light sections. Further augmentation of the supply of sheet bars is still needed to enable the sheet mills to cope with their extensive commitments.

Home demand for all descriptions of finished steel products is too extensive and too urgent to permit of any substantial expansion of the export trade. Indeed, the contraction of production during July and August—although much less than usual in the holiday period—has involved short deliveries to some consumers during Period III, and a consequent carry-forward of authorisation into this period. The call for sheets and plates is particularly heavy, and rail and section mills also have extensive bookings.

Non-ferrous Metals

Evidence is not lacking that tin is responding to the spur afforded by an inflated price, for world production is on an increasing scale; output in July at 14,700 tons set up a new post-war record. On the other hand, consumption appears to be easing somewhat and declined from 11,800 tons to 11,400 tons. This is probably only a passing phase, for stockpiling can be relied upon to take care of any surplus metal. But production is certainly going ahead and foreshadows the time when output and usage will be in alignment again. In the meantime, producers are earning good profits from their sales at the current price; but the consuming end of the industry is not nearly so happy, and there can be little doubt that the use of tin is being discouraged by the very high price. Wherever possible, substitutes will be employed, and when in due course tin is again available at a reasonable figure, producers will find, no doubt, that their product has lost favour to a considerable extent.

In brass and copper, trade is not very brisk, and the new price level made necessary for semis through the rise in copper and zinc, together with the engineering wages award, is certainly not encouraging demand. Scrap is, of course, cheap, but there is a limit to the amount of secondary metal which the mills can absorb and it would seem, broadly speaking, that the trade has been taking maximum possible quantities for some time past. The future of scrap values is not easy to determine, for while margins to-day undoubtedly favour the buyer, representing as they do discounts below virgin-metal prices which transcend anything seen before the war, the downward pressure on values exerted by the Ministry of Supply's sales of material by competitive tender may well result in the gap between new and old metal prices becoming even wider. Judging by the most recent stock figures available, it would seem that the Government still has a considerable tonnage of secondary material for disposal even though no more arisings accrue.

Co-operative Research

Mr. Herbert Morrison, M.P., Lord President of the Council, addressing the chairman of councils and the directors of the Industrial Co-operative Research Associations at a conference in London, referred to the British Cast Iron Research Association, and said it had had a large share in raising the output of the ironfoundry industry from 2½ million tons pre-war to 3½ million tons a year at present. At the same time, much fuel had been saved and the product had been improved. This research association had also developed a remarkable new product of great shear strength—nodular cast iron—which was being developed in a number of foundries at the present time and might soon be earning dollars in the United States.

Sand Preparation

"Sand Preparation for Foundry Work" was the title of a Paper read by Mr. H. P. Hughes to an attendance of over 60 at the first separate gathering of foundry workers and patternmaker members of the Rochdale (Lancs) section of the National Trades Technical Societies, held in the works canteen of Thomas Robinson & Son, Limited, on October 4. A committee has been formed to represent the group and organise a monthly series of discussions or lectures throughout the winter, suitable for the foundry workers and patternmakers of the district.